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ABSTRACT

This instructors manual consists of materials for use in presenting a course in the occupational area of medical laboratory aide. Included in the first part of the guide are a program master sequence; a master listing of instructional materials, equipment, and supplies; an overview of the competency-based vocational education (CBVE) system; and guidelines and strategies for addressing students with special needs. The major part of the publication comprises instructor's guide sheets, master copies of the instructor's final checklist, master copies of the check-out activity sheets, answer keys for the check-out activity sheets, a recommended references listing for the medical laboratory aide modules, and student modules. Provided in the student modules are learning activities, instruction sheets, and self-check activities dealing with the following topics: learning about medical careers, learning medical laboratory terminology, performing physical tests on urine, performing chemical tests on urine using dipsticks, and making and staining blood smears. (MN)

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Instructor's Manual
for
HEALTH SERVICES: CLINICAL
Medical Laboratory Aide

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[Student Package]

FOREWORD

The purpose of this instructor's manual is to aid the instructor in managing the use of modules for Health Services: Clinical Area of the Medical Laboratory Aide. Review the TABLE OF CONTENTS for the location of the Instructor's Guide Sheets for these modules.

A PROGRAM MASTER SEQUENCE, a HEALTH SERVICES: CLINICAL COMPETENCIES (Sample Evaluation) for the medical laboratory aide, and a MASTER LISTING OF INSTRUCTIONAL MATERIALS, EQUIPMENT, AND SUPPLIES have been prepared to provide an over-all view of the program and the instructional needs.

To aid the instructor in understanding competency-based vocational education, a section is provided about the CBVE instructional system. For helping the instructor meet the needs of special students, a section about identifying students with special needs, formulating a basic approach to teaching these students, and using special strategies and redirecting teaching strategies is provided.

A RECOMMENDED REFERENCES LISTING FOR MEDICAL LABORATORY AIDE MODULES has been prepared, so the instructor can post the required readings for the modules. During orientation to the use of modules, the instructor can explain the use and location of the reference listing. This will aid classroom management.

ACKNOWLEDGMENTS

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PROGRAM MASTER SEQUENCE
HEALTH SERVICES: CLINICAL
Medical Laboratory Aide

Code Number	Module Title	Module Stock Number
HS-ML-1	Learning About Medical Laboratory Careers	5-975
HS-ML-2	Learning Medical Laboratory Terminology	5-976
HS-ML-3	Performing Physical Tests on Urine	5-977
HS-ML-4	Performing Chemical Tests on Urine Using Dipsticks	5-978
HS-ML-5	Making and Staining Blood Smears	5-979

HEALTH SERVICES: CLINICAL COMPETENCIES

MEDICAL LABORATORY AIDE--D.O.T. #078.381-011

(Sample Evaluation)

Student's Name: _____

Address: _____

Date Entering Program: _____

Date Completing Program: _____

Evaluation Code*:

0. The task was not applicable.
1. The student completed the task with close supervision.
2. The student completed the task with limited supervision.
3. The student completed the task without supervision.
4. The student completed the task at job-entry level.

<u>EC*</u>	<u>TASK LIST</u>	<u>MODULE NUMBER</u>
_____	1. Name the major accrediting agencies for medical laboratory personnel.	HS-ML-1
_____	2. Draw an organizational chart of the department.	HS-ML-1
_____	3. Match ten common laboratory abbreviations with the meanings.	HS-ML-2
_____	4. Define twenty laboratory terms.	HS-ML-2
_____	5. Practice safety in the medical laboratory.	
_____	6. Provide first aid for common laboratory accidents.	
_____	7. Practice cleanliness in the laboratory.	
_____	8. Label clinical specimens.	

EC*TASK LISTMODULE NUMBER

9. Log in specimens.
10. Use and care for the microscope.
11. Identify acceptable methods of laboratory waste disposal.
12. Identify patients according to recognized procedures.
13. Complete a laboratory requisition/request form.
14. Fill out an incident report form.
15. Utilize disinfection procedures.
16. Clean E.K.G. equipment after use.
17. File E.K.G. reports in patient's file record.
18. Mount E.K.G. graphs.
19. Perform E.K.G. tests.
20. Perform Master's two-step E.K.G. test.
21. Prepare patient for E.K.G. test.
22. Receive E.K.G. reading on the data phone.
23. Transport specimen.
24. Instruct patient as to procedure for urine collection.
25. Distribute clinical specimens to laboratory section.
26. Centrifuge clinical specimens.
27. Process miscellaneous specimens.
28. Use beakers, flasks, and graduates.
29. Identify pipets and other types of laboratory glassware.
30. Use pipets.
31. Clean laboratory glassware manually.
32. Clean laboratory glassware by machine.
33. Use drying oven.
34. Use autoclave/steam sterilizer.
35. Distribute glassware to appropriate laboratory section.
36. Use a triple beam or torsion balance.
37. Prepare volume/volume solutions.
38. Prepare weight/volume solutions.
39. Make percent calculations.
40. File laboratory reports.
41. Keep temperature records.
42. Complete charge slips for laboratory procedures.
43. Assess and record urine color.

HS-ML-3

<u>EC*</u>	<u>TASK LIST</u>	<u>MODULE NUMBER</u>
_____	44. Assess and record urine transparency.	HS-ML-3
_____	45. Assess and record urine odor.	HS-ML-3
_____	46. Assess and record specific gravity.	HS-ML-3
_____	47. Test and record urine pH.	HS-ML-4
_____	48. Test and record urine glucose.	HS-ML-4
_____	49. Test and record urine protein.	HS-ML-4
_____	50. Test and record ketones.	HS-ML-4
_____	51. Test and record bilirubin.	HS-ML-4
_____	52. Test and record urine blood.	HS-ML-4
_____	53. Test and record urobilinogen.	HS-ML-4
_____	54. Prepare a thin blood smear.	HS-ML-5
_____	55. Stain with Wright's stain.	HS-ML-5
_____	56. Prepare a specimen for shipment.	
_____	57. Prepare a thick blood smear.	
_____	58. Prepare urine for microscopic examination.	
_____	59. Set up and read sedimentation rate.	
_____	60. Set up and make slides for reticulocyte count.	
_____	61. Prepare 24-hour urine collection containers.	
_____	62. _____	
_____	63. _____	
_____	64. _____	
_____	65. _____	

A MASTER LISTING OF INSTRUCTIONAL MATERIALS,
EQUIPMENT, AND SUPPLIES

● Recommended References:

Barnett, Medical Laboratory Assistant (Student's Manual). Austin, TX: Center for Occupational Curriculum Development, Division of Continuing Education, The University of Texas at Austin, 1981.

Birchenall and Streight, Introduction to Health Careers. Philadelphia, PA: J.B. Lippincott Company, 1978.

Bureau of Labor Statistics, Occupational Outlook Handbook, 1978-79 Edition. Bulletin 1955. Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1978.

Simmers, Diversified Health Occupations. Albany, NY: Delmar Publishers, 1983.

Tabor's Cyclopedic Medical Dictionary. Philadelphia, PA: F.A. Davis Company, 1977.

Wittman and Thomas, Medical Laboratory Skills. St. Louis, MO: McGraw-Hill Book Company, 1977.

● General Instructional Equipment:

- Film projector
- Filmstrip projector
- Cassette tape player/recorder
- Overhead projector
- Projection screen

● Equipment and Supplies:

- | | |
|---------------------------------|-------------------------|
| --Urine specimens | --Whole blood specimens |
| --Urinometer | --Slides |
| --Refractometer (TS Meter) | --Alcohol |
| --Record pad | --Lint-free cloth |
| --Package inserts for dipsticks | --Distilled water |
| --Laboratory report forms | --Marking pencil |
| --Dipsticks | |
| --Prepared slides | |
| --Staining rack | |
| --Wright's stain | |
| --Gauze | |

**OVERVIEW OF THE
CBVE
INSTRUCTIONAL
SYSTEM**

Competency-Based Vocational Education
Using the Instructor's Manual
Managing a CBVE Program

Competency-Based Vocational Education

The purpose of this manual is to aid the instructor in implementing a competency-based instructional program. It is intended as a guide and resource for the teacher using CBVE modules or task assignment sheets.

CBVE is based on competency. The instructional system incorporates (1) the competencies for specific occupations built around worker tasks (2) performance objectives and (3) the specified minimum standards of performance required for entry-level jobs. The performance objectives include: (1) the skills (or tasks) which the student must learn; (2) the conditions under which the student must perform; and (3) the standard or level of achievement to which the student must perform. The learning activities are directly related to job skill.

In addition to competency development, the materials address (1) readability; (2) variety of learning activities; (3) elimination of sex stereotyping; and (4) curriculum modification for disadvantaged and handicapped students.

The Curriculum Unit which develops and implements competency-based instructional materials is located in the Kentucky Department of Education, Office of Research and Planning, 1912 Capital Plaza Tower, Frankfort, KY 40601.

In addition, each vocational region has a CBVE Contact Person to assist with implementation. Any problems or concerns about your CBVE program should be discussed with your Regional Contact Person.

Each teacher is to receive inservice involving how to conduct a competency-based program and utilize competency-based materials prior to implementation. In addition, Inservice Education modules are available as references, giving detailed suggestions for setting up and managing a CBVE program.

Using the Instructor's Manual

This instructor's manual is divided into three sections: course introduction, program organization, and an instructor's guide to learning activities.

The Instructor's Guide to Learning Activities is the heart of this manual. It contains a brief listing of the contents of each module with suggestions for their use. Removing the guide sheets and filing them with the corresponding modules will give the instructor the complete materials for lesson planning in one place.

Format is consistent throughout all modules. Each contains the same basic components:

Introduction - tells the student what he/she will learn and why it is important.

Directions - lists any prerequisites to the module and directs the student to either the learning activities or check-out activity.

Objectives - clearly state what the student is expected to know or do, under what conditions, and how well.

Learning Activities - a "road map" for the student to follow in going through the module or assignment sheet; lists the various activities the student will perform in learning the task.

Instruction Sheets - may be job sheets, information sheets, etc., that provide the student with important information or practice.

Student Self-Checks - brief, objective tests that serve as progress checks for the student; usually cover the cognitive information presented in the module.

Instructor's Final Checklist - tells the student and the instructor exactly what the student will be evaluated on in the check-out activity; the instructor uses this sheet to rate the student's performance.

Check-Out Activity tells the student what he/she will be asked to do for the final test or performance.

The Instructor's Guide Sheets in this manual present the essential information in the modules in capsule form. In addition, they list: notes and suggestions for instruction; the recommended references and audiovisuals; necessary tools and equipment; and space for teacher's notes.

The modules are designed to be left intact. Students should be reminded not to write on any of the pages. In some cases, they will be required to obtain duplicates or sheets like the ones shown. A supply of all master copies the instructor elects to use should be made in advance and filed with the modules or placed in a file for ready use.

There are also pages that the student needs that are not contained within the modules. These are usually the check-out tests, but they may also be other materials which are supplemental to the actual module. These pages should also be filed separately and kept by the teacher. They should be accessible to the students at the appropriate time.

Managing a CBVE Program

Managing a CBVE program is no easy task. However, if time and care are taken in setting up the program, it can be managed with a minimum of difficulty. The important thing is to implement a system that will work in your classroom, and then carry it through consistently. For example, you will want to establish some procedures for the storage and use of modules, student folders, reference books, slide-tape presentations, audio-visual equipment, etc. Refer to Module IE-8, "Managing a CBVE Program" for specific suggestions.

As with any change or innovation in classroom procedure, students will be more receptive to CBVE if you spend time orienting them to the new way of doing things. When you first implement your program, set aside a day or two to familiarize students with the modules or task assignment sheets and accompanying media. Demonstrate the proper use of the audio-visual equipment. Familiarize students with your management system, i.e., where to obtain modules or assignment sheets and return them when completed, where to file check-out activities, etc. Remember that your enthusiasm about CBVE is catching! If students see that you believe in CBVE they will much more likely accept and use it. Don't forget to orient additional students who come into your program later in the year. (For more suggestions, see Module IE-8, "Managing a CBVE Program.")

Since student demonstration of competency in a task is an essential concept in CBVE, the modules or assignment sheets have been designed for individualized instruction. This does not mean that material cannot occasionally be presented in large or small group settings. Some lessons, such as safety, might best be presented to the whole class, but students must individually demonstrate their knowledge of safety procedures and practices. In some programs, small group discussion may facilitate the understanding of some concept, or a team of three to four students might work together on some project. When checking out, however, each student must be able to demonstrate his/her competence in performing each task. See Module IE-8 for additional suggestions.

Teachers often ask about grading students. There is no easy solution to the problem of grading in a competency-based program. Some suggestions are given in Module IE-9, "Evaluating Students and Keeping Progress Records." The primary basis for grading is student performance on the Instructor's Final Checklist. You must devise a system of assigning grades. (See IE-7, "Evaluating Students and Keeping Student Progress Records.")

ADDRESSING STUDENTS WITH SPECIAL NEEDS

Identifying Students with Special Needs

Formulating a Basic Approach to Teaching

Using Special Strategies

Redirecting Teaching Strategies Usually Used

ADDRESSING STUDENTS WITH SPECIAL NEEDS

Some students may need special help in achieving competency. Ideas are presented here for helping identify those students and modifying materials and techniques to help them succeed.

Identifying Students with Special Needs

Generally speaking, those students who cannot succeed in the regular vocational education programs without special help are termed "students with special needs" (Vocational Educational Act of 1963 and Amendments). Persons most likely to be identified as students with special needs are the academically and economically disadvantaged and the handicapped--the mentally retarded, deaf and hard of hearing, speech impaired, emotionally disturbed, orthopedically (physically) impaired, health impaired, and learning disabled.

The handicapped are further identified as those (1) with a physical or mental disability that substantially impairs one or more major life activity--walking, seeing, hearing, speaking, working, or learning; (2) who have a record or history of such impairment or condition; and (3) are regarded as having an impairment (Rehabilitation Act of 1973). Women, minorities, the limited English speaking, and others likely to be underemployed or striving for equal opportunity in employment, when meeting the criteria for academic or economic deprivation, are specifically identified in the disadvantaged group to be given special help.

Formulating a Basic Approach to Teaching

Society recognizes the right of every individual to an appropriate education, and the law mandates giving persons with special needs an equal chance. In brief:

1. The Vocational Education Amendments of 1976 give special emphasis to developing and providing programs of vocational education for "those with special educational handicaps" and reserve moneys to do so.
2. The Education for All Handicapped Children Act of 1975 assures that all handicapped children between the ages of three to twenty-one have available to them a free, appropriate public education which relates to their unique needs and is provided in the least restrictive environment.
3. The Rehabilitation Act of 1973 prohibits discrimination on the basis of handicap in any program or activity receiving federal financial assistance and directs employers to take affirmative action in hiring handicapped people.
4. The Education Amendments of 1972 prohibit discrimination on the basis of sex in educational programs receiving or benefiting from federal financial assistance.

5. The Civil Rights Act of 1964 prohibits discrimination in employment on the basis of sex, race, color, religion, or national origin in any program or activity receiving federal financial assistance--including training for employment.

We must, then, provide equal opportunity to learn in our instructional processes.

Basically, an approach to teaching which recognizes individual differences in all students provides the best atmosphere for disadvantaged and handicapped students. This approach allows students to work at different rates; involves large group, small group, and individual instruction; incorporates a variety of instructional materials, media, and teaching techniques; and involves a variety of learning activities--reading, doing, discussing, listening, viewing, experiencing, sharing, cooperating, relating, using the senses, etc. It gives disadvantaged and handicapped students the dignity of exploring, learning, and facing the same experiences and responsibilities as other students, without limiting their possibilities by stereotyped concepts of what they can or cannot do.

It involves being organized, with students completely familiar with the teaching/learning plan. When beginning a CBVE class, for example, explain what learning to attain competencies means, how the students will carry out their work, how to use the modules, where to find materials, how and when tests will be given, how "passing" or competency is determined, and what your role as a teacher is.

It also means teacher direction for those students who are not self-directed learners--those with poor academic backgrounds who thrive on teacher interaction and need immediate feedback, instruction simplified, procedures modified, social development as well as specific job skills, role models, or other special aid. For these students, the learning activities described in the modules may become the teacher's lesson plan and utilized in large-group and small-group settings before the individual student attempts doing learning activities alone. The teacher-directed class might proceed as follows: teacher introduction to tasks to be performed by module or cluster of modules, explanation of what is to be learned and why, presentation of information in small chunks, demonstration of how, student tryout and practice, time for questions and answers, trial test followed by reteaching, and evaluation. The teacher will employ a variety of strategies to address the learning needs and styles of the student.

Using Special Strategies

In order to determine the most appropriate teaching strategies, assess the class for kinds of special help required, and develop a plan for meeting any unique needs. Refer to Mainstreaming Guidebook for Vocational Educators by Dahl, Appleby, and Lipe, Olympus Publishing Company, Salt Lake City, Utah 84105, for modifications and general classroom strategies for meeting the unique needs of the different handicapped populations.

Also, enlist the advice and help of employers, support personnel, and agencies and organizations serving disadvantaged and handicapped populations in your school system and geographic area.

Redirecting Teaching Strategies Usually Used

Many of the strategies usually used with regular students may be redirected or modified and also provide effective learning activities for students with special needs. An explanation of how this may be done follows.

AUDIO-VISUALS (films, filmstrips, slide/tape, videotapes, and ETV and commercial television programs). The combination of sight and sound provides more effective communication than either sight or sound alone. Audio-visuals may be used to supplement or replace other methods of presenting information. The hearing impaired will require captioning, signing, or a printed script written at the appropriate reading level or presenting only essential details. The visually impaired may glean information from the sound source, but additional explanation will need to be provided for any visual display of information which is not explained adequately by the narration. Some audio-visual presentations, particularly 8 mm and 16 mm films, may move too fast for the information to be grasped and need to be evaluated with this in mind.

CONTACT WITH WORK ENVIRONMENT. Handicapping conditions, limited finances, geographic isolation, cultural difference, limited communication skills, and social isolation have caused disadvantaged and handicapped persons to have little contact with the world of work. Familiarity with the work setting in which a particular job takes place, relationships with other workers, business use of the telephone, relationship of one's job to other jobs in the same business are just a few examples of areas where special students may require special exposure by means of field trips, spending a day on the job, viewing films, or having additional training sessions.

NOTE: For those with physical impairments, field trips, on-site job observations, and work experience opportunities will be limited to "accessible" businesses in the community. Before deciding where to go, determine whether the facilities are accessible.

DEMONSTRATION AND TRYOUT. Demonstration by teacher, experienced workers, and previously trained students provide reliable role models for learners. Steps, procedures, precautions, physical manipulation, and techniques are imprinted visually in the order and at the time they should occur in task performance. Immediate tryout of the task following the demonstration or an immediate attempt of each step, technique, or procedure as it is demonstrated provides students direct involvement, permits correction and clarification, and promotes retention. Tryout also identifies areas in performance steps, techniques, tools, and work environment where handicapped students need to have modification in order to perform tasks and meet industry standards.

ELIMINATION OF STEREOTYPING. Disadvantaged and handicapped people face more than the sex role stereotyping myths in their quest for employment. The following are just a few examples: "Deaf people are dumb." "The best job for blind people is tuning pianos." "He'll never be able to do that; he's a cripple." "Mr. _____ was no good; so will be his son." "She can

never do that; her parents didn't go to college." In addition to overcoming the unfounded assumptions of others, disadvantaged and handicapped often have equal misconceptions about themselves thinking: "I can never do that." "_____, who is deaf does assembly line work; that's what I'll do, too." "I'll never be anybody."

Overcoming stereotyping may begin with using sex fair instructional materials and media, exploring interests and abilities, exploring two or three nontraditional jobs, or complimenting accomplishments. It may include planning how to reach an educational goal, providing role models (person with like handicap or socioeconomic background who has succeeded), as well as observing persons in nontraditional work roles. It means doing whatever raises aspirations and increases self-worth. It means attempting to eliminate underemployment.

EMPLOYER INVOLVEMENT. Programs with employer input are more practical and in line with the current needs of the job market. Employers who make input feel a special kinship to the program and get a chance to see the students before meeting them in the job market.

For disadvantaged and handicapped students, employer involvement offers a very special opportunity to remove common misconceptions about their capabilities. It enables employers to help with any modification needed, see students performing tasks, and observe how the students relate to others. It gives students a chance to prove that they can do the work, that they will not endanger themselves or others, and that they will not increase expenses. These are major employer concerns. Both students and teachers should be prepared to provide reassuring answers and evidence to show there is no more risk than with the nonhandicapped.

Employers may be involved by giving class presentations; giving suggestions for program improvement and modifications; conducting mock interviews; and providing work experience, observations and worker interviews, job analysis, etc.

HANDS-ON EXPERIENCES, PROBLEM SOLVING, PERSONAL INVOLVEMENT (work samples, tryout exercises, games, role playing). Being involved in a sample of work through completing a product, performing related paper work, or role playing interpersonal relationships on the job keeps students interested, holds attention to the learning tasks, and injects the realities of working and job performance in the teaching/learning situation. It makes the student feel that the instruction is practical and valuable. Accomplishment means "qualified for work"--a great boost to self-esteem for those who doubt self-worth.

The instructor and other students should avoid taking over when handicapped students are awkward or slow in completing a task. The student cannot master the skill if someone else does it.

ILLUSTRATIONS (pictures, graphs, bulletin boards, transparencies, and other visuals). The disadvantaged, the mentally retarded, and the hearing impaired, particularly, are especially oriented to visual methods of learning. Other students, with the exception of the blind and some visually impaired, will appreciate visual presentation of information to

be learned. Student handouts, with the steps to a task illustrated and briefly and simply explained, are especially helpful. Captioning and brief explanations are important supplements. Many illustrations may be adapted for the visually impaired by making them tactile (so that they can be felt). Sometimes enlarged print and bold outlines help.

INTERACTION; INDEPENDENCE. Economic deprivation, geographic isolation, cultural isolation, and restrictions on mobility and social relationships imposed by physical impairments have limited the experiences of the disadvantaged and the handicapped in the community at large. Many have no previous work experience, little observation of the worker's daily routine, and limited social experiences. They have been sheltered at home, absent from the scene, at best onlookers.

So that they will not continue in this role after vocational training, experiences in the community and involvement with nonhandicapped people and other students are of utmost importance. These students, as well as their families and the working community, need proof that they can function independently and competently. They need to establish contacts who can serve as references to recommend them as competent workers who can relate to others.

Field trips, worker interviews, cooperative work experience, spending a day on the job, giving talks before civic groups are, therefore, important to the acclimation of disadvantaged and handicapped students to the world of work. Participating in team work projects with other students; pairing with a slower or faster learning peer; pairing with a nonhandicapped, a nondisadvantaged, or person from another race or culture will help foster understanding and promote learning communication skills. Teaching special units dealing with related communication and social skills will also be necessary; for example: office etiquette, relationships with employer and other employees, daily work expectations which are not direct task performance, telephone skills, appropriate dress and grooming habits, to name a few.

LISTENING (explaining, discussing, reacting orally). Learning by listening is an important tool to the disadvantaged, the visually impaired, speech impaired, learning disabled, and others who "prefer to be told" or "have to be told" rather than read about it.

The visually impaired require identification of familiar sounds in the work place to determine location of different work areas, equipment functions, and hazards. The hearing impaired require sight substitutions, such as indicator lights, for critical sounds they cannot hear. They may use lip reading, interpreting, and sound conduction or amplification devices. The retarded need to become accustomed to the sounds of the work place so that they can work without being distracted. The speech impaired need to be accorded the right to listen although they may have trouble participating, or not be able to participate orally.

When information is presented for listening, instruction in how to listen (what to listen for) is important. An outline of the information presented, supplemented by visuals, tryout exercises, showing, completion

of a guidesheet questions to be answered, analysis of cases or problem situations, or other application activities will enhance use and retention of information heard.

Listening is a vocational skill as well as a learning skill. Workers must be able to receive information by listening as well as provide information for listening. Most on-the-job instruction is given orally. Explanation must be given to and received from customers, co-workers, and supervisors.

READING HELPS. Being fluent in the technical vocabulary or language of the job and able to read at the level required by the job is a part of occupational competency. On-the-job reading requirements may vary from the reading of signs to following instructions given in technical manuals. The instruction given in reading, then, for vocational purposes, will depend on the reading skills possessed by the student and the reading requirements of the job. Whether or not a supplemental class in remedial reading is offered, the vocational instructor will find providing reading helps also helps provide job skill.

Braille materials, large print textbooks, magnifying devices, and recordings may be provided for the visually impaired. Materials may be simplified or outlined for the hearing impaired and others with limited language skills. The native language may be supplied above the English for critical information in textbooks used by the limited English-speaking. Familiarity with the setting in which the printed information is applied may be given via field trips, demonstrations, or films to make reading easier and more meaningful.

Students with exceptional reading problems may require the help of a special reading teacher or be enrolled in a remedial reading program. Some schools employ vocational reading teachers to assist vocational students with developing vocational reading skills and doing the reading required in their programs.

RECORDING AND RECORDINGS (tapes, records, radio programs). Information may be presented and gained by listening to recorded information rather than reading. This strategy will aid the nonreader, the poor reader, the visually impaired, the learning disabled, and others through use as a variation of teaching technique. Recording is also a useful tool for the deaf in notetaking; the recording script may be transcribed into print later by a hearing individual. It will also provide instruction for those who have missed initial classroom presentation of information or who need review. Recordings may be supplemented by slides and pictures.

RELATED MATH. Competency in math, like competency in reading, is more critical to some jobs than to others. Math is best taught in relation to the task of which it is a part. This instruction should incorporate basic math and remedial math instruction as needed. A cooperative or team teaching effort with the math teacher, or related math instructors in the school will relieve the burden on the vocational instructor. Enough practice and application exercises should be provided to insure retention of the math operations involved. It is helpful to compile a list of the

math competencies needed to complete the training program, prepare an assessment test to determine student skills, and plan in the beginning a program which the student can follow to attain the basic math competencies prerequisite to the course. If the skills cannot be acquired simultaneously to the job skill training program, the student should postpone entry into the course until the prerequisite skills are attained. It may be necessary to prepare a special manual and modules to provide the related math instruction.

REMEDIAL AND RETENTION EXERCISES. Doing learning activities does not necessarily make students occupationally competent. Performance must be observed, misunderstandings clarified, procedures and techniques corrected, and repetition called for at future time. Lesson planning should anticipate theory and tasks with which students are likely to have difficulty, include additional practice exercises, and provide alternate approaches to teaching. Repetition for retention should be provided, such as repetition of information in different media presentations or use of different types of application exercises. Review sessions, keeping notebooks, completing work samples, doing live work, and solving cases will also help.

SAFETY. The Occupational Health and Safety Act has increased employer concern for safety and underscored the importance of providing safety instruction along with task performance. It is especially important for the handicapped in two ways: (1) to overcome employer concern about the handicapped person's ability to take care of himself/herself and not endanger the lives of others; (2) to identify and deal with situations which are hazardous for persons because of particular handicaps.

To meet these needs for safety instruction, the handicapped student not only needs the basic or general safety instruction related to the occupation but safety instruction or special safety provisions needed for a person with his/her particular handicap. An example is the installation of a blinking light to tell a person who is deaf that equipment is running.

NOTE: The Kentucky Department of Labor, Occupational Safety and Health Program, Division of Education and Training, Frankfort, Kentucky 40601, Phone: (502) 564-6895, offers training programs to help vocational instructors teach safety.

SUPPORT SERVICES. Some students will require emotional, social, and financial support in order to succeed in the instructional programs. Others will need career counseling and special assistance in becoming employed. Government agencies, special schools, special personnel, and organizations for disadvantaged and handicapped persons can provide this help. The following are examples and should not be considered an all-inclusive list: resource room teachers, rehabilitation counselors, guidance counselors, tutors, remedial teachers, instructors in special schools, occupational therapists, diagnostic specialists, media personnel, handicapped workers, workers who are members of a minority group, social workers, and others who can serve as role models. Survey the community to identify who serves the needs of disadvantaged and handicapped persons in your area and incorporate their assistance in related learning activities.

UNIQUE MODIFICATIONS (modified equipment, tools, learning aids, changes in work environment, adaptations in course or training program content). Some students require special help in meeting physical job requirements. When considering modification, it is important to concentrate on what the student can do. If at all possible, enable the student to function in the work environment as it is usually found. Employers look favorably on handicapped persons with this kind of preparation.

Rehabilitation centers; organizations and schools for the blind, deaf, dyslectic, disabled, and the mentally handicapped; and publishers and manufacturers of special instructional materials, aids, and equipment can offer aid in meeting unique needs. Consultation with special education personnel and rehabilitation counselors is a good starting point. The student should also be asked to make suggestions.

Care should be taken to insure occupational competency. Prospective employers should be shown how the modification operates in the work setting and how it increases efficiency.

The previously described list of strategies is not exhaustive. Others may be added. All will need to be directed toward the occupation for which training is being given, the students enrolled, the availability of instructional materials, and the community. It is also important to remember that what works well for one group of students or a particular student will not necessarily work well for another.

**INSTRUCTOR'S GUIDE
TO
LEARNING ACTIVITIES**

Instructor's Guide Sheets

Master Copies of the Instructor's Final Checklist

Master Copies of the Check-Out Activity Sheets

Answer Keys for Check-Out Activity Sheets

LEARNING ABOUT MEDICAL LABORATORY CAREERS

OBJECTIVE

Given a test about medical laboratory careers, answer the questions. The test must be completed with 100% accuracy.

CONTENTS OF MODULE

	<u>Learning Activity Number</u>
<u>Instruction Sheets</u>	
I MEDICAL LABORATORY CAREERS.....	2
II THE ACCREDITING AGENCY FOR MEDICAL LABORATORY CAREERS.....	3
<u>Student Self-Check</u>	
I MEDICAL LABORATORY CAREERS.....	4
<u>Instructor's Final Checklist</u>	
LEARNING ABOUT MEDICAL LABORATORY CAREERS.....	5

CHECK-OUT ACTIVITY

Obtain a copy of the Check-Out Activity Sheet, MEDICAL LABORATORY CAREERS, from your instructor. Complete the test and return it to your instructor for evaluation.

Check-Out Activity Sheet

MEDICAL LABORATORY CAREERS.....	5
MEDICAL LABORATORY CAREERS--ANSWER KEY.....	5

RECOMMENDED REFERENCES

Birchenall and Streight, Introduction to Health Careers. Philadelphia, PA: J.B. Lippincott Company, 1978.

Bureau of Labor Statistics, Occupational Outlook Handbook, 1978-79 Edition. Bulletin 1955. Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office, 1978.

Wittman and Thomas, Medical Laboratory Skills. St. Louis, MO: McGraw-Hill Book Company, 1977.

LEARNING ABOUT MEDICAL LABORATORY CAREERS

LA#	NOTES AND SUGGESTIONS FOR INSTRUCTION	REFERENCES AND SPECIAL TOOLS AND EQUIPMENT	TEACHER'S NOTES
1	If an audio-visual material about medical laboratory careers is available, show it to the students. Have a discussion session immediately following the showing.	RECOMMENDED REFERENCE Wittman and Thomas, <u>Medical Laboratory Skills</u> , pp. 6-10.	
2	Have the students use the ANSWER KEY, provided in this section of the manual, to check their work.	RECOMMENDED REFERENCES Wittman and Thomas, <u>Medical Laboratory Skills</u> , p. 7. AND/OR Birchenall and Streight, <u>Introduction to Health Careers</u> , pp. 83-90. AND/OR Bureau of Labor Statistics, <u>Occupational Outlook Handbook, 1978-79 Edition</u> , pp. 476-478.	
3			
4	Student Self-Check		
5	Provide a copy of the Check-Out Activity Sheet for each student. Check the tests using the ANSWER KEY provided in this section of the manual.	--Copies of the Check-Out Sheet, MEDICAL LABORATORY CAREERS. (A Master Copy and an Answer Key are provided in this section of the manual.)	

LEARNING ABOUT MEDICAL LABORATORY CAREERS

LA#	NOTES AND SUGGESTIONS FOR INSTRUCTION	REFERENCES AND SPECIAL TOOLS AND EQUIPMENT	TEACHER'S NOTES
	Use the Instructor's Final Checklist to check each student's performance.	--Copies of the Instruc- tor's Final Checklist. (A Master Copy is provided in this section of the manual.)	

INSTRUCTION SHEET I

MEDICAL LABORATORY CAREERS

Answers may vary.

CAREER	EDUCATIONAL REQUIREMENTS	LABORATORY RESPONSIBILITIES
Medical technologist	--Usually requires four years of senior college training.	--Performs specialized laboratory tests-- in the major areas of hematology, bacteriology, serology, chemistry, blood banking, urinalysis,, mycology, parasitology, and immunology--with minimum supervision.
Medical laboratory technician	--Generally requires two years of community college or junior college training.	--Performs tests and procedures under the supervision of the medical technologist.
Cytotechnologist	--Requires the equivalent of two years of college training.	--Performs microscopic examinations of cells and tissue sections for the presence of cancer.
Histologic technician	--One to two years of technical training after high school.	--Prepares a wide variety of tissues for microscopic examination by the pathologist.
Medical (or clinical) laboratory assistant	--Usually trained at an educational level below that of the junior or community college.	--Performs tests of a basic and routine nature under the direction of a pathologist and/or a medical technologist. --Operates and maintains laboratory equipment and supplies. --Prepares solutions, cultures, and media. --Performs simple biological stains.

INSTRUCTION SHEET I, (page 2)

CAREER	EDUCATIONAL REQUIREMENTS	LABORATORY RESPONSIBILITIES
		--Receives and delivers laboratory specimens. --Prepares smears. --Stains slides.
Medical laboratory aide	--Usually trained at an educational level below that of the junior or community college (vocational-technical school training).	--Performs such routine tasks as assisting in maintenance of laboratory equipment, requisitioning supplies, maintaining inventory, and sterilizing equipment and instruments. --May assist in the preparation of solutions, cultural media, and biological stains. --May receive and deliver lab specimens and requisitions. --Assists with recordkeeping. --Takes messages.

CHECK-OUT ACTIVITY SHEET

MEDICAL LABORATORY CAREERS

Directions: Answer the following questions. When you have finished the test, return it to your instructor for evaluation.

1. Name five medical laboratory careers.
2. What is the name of the major accrediting agency for medical laboratory personnel?
3. What is the main responsibility of medical laboratory personnel?

CHECK-OUT ACTIVITY SHEET

MEDICAL LABORATORY CAREERS

ANSWER KEY

1. Any five of the following:
 - Medical technologist
 - Medical laboratory technician
 - Cytotechnologist
 - Histologic technician
 - Medical (or clinical) laboratory assistant
 - Medical laboratory aide
2. American Society of Clinical Pathologists
3. The main responsibility of medical laboratory personnel is to assist physicians by performing diagnostic tests on patients' blood, tissues, and body fluids using precise instruments.

MASTER COPY

INSTRUCTOR'S FINAL CHECKLIST

LEARNING ABOUT MEDICAL LABORATORY CAREERS

The student should be evaluated according to the performance ratings in the box. Indicate on a separate sheet of paper whether the student's performance for each item is Fully Accomplished, Partially Accomplished, Not Accomplished, or under certain circumstances, Not Applicable.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will decide which learning activities must be repeated.

Fully Accomplished	Partially Accomplished	Not Accomplished	Not Applicable
-----------------------	---------------------------	---------------------	-------------------

The student completed Check-Out Activity Sheet,
MEDICAL LABORATORY CAREERS, with 100%
accuracy.....

[] [] [] []

LEARNING MEDICAL LABORATORY TERMINOLOGYOBJECTIVES

- (1) Given a list of medical laboratory abbreviations and definitions or descriptions, match each meaning with the correct abbreviation. The test must be completed with 90% accuracy.
- (2) Given a list of medical laboratory definitions or descriptions, write the correct word or term for each definition or description. The test must be completed with 90% accuracy.

CONTENTS OF MODULE

<u>Instruction Sheets</u>	<u>Learning Activity Number</u>
I MEDICAL LABORATORY ABBREVIATIONS.....	1
II MEDICAL LABORATORY TERMINOLOGY.....	3
 <u>Student Self-Checks</u>	
I MEDICAL LABORATORY ABBREVIATIONS.....	2
II MEDICAL LABORATORY TERMINOLOGY CROSSWORD PUZZLE.....	4
 <u>Instructor's Final Checklist</u>	
LEARNING MEDICAL LABORATORY TERMINOLOGY.....	6

CHECK-OUT ACTIVITIES

- (1) Obtain a copy of the Check-Out Activity Sheet I, MEDICAL LABORATORY ABBREVIATIONS, from your instructor. Complete the test and return it to your instructor for evaluation.
- (2) Obtain a copy of the Check-Out Activity Sheet II, MEDICAL LABORATORY TERMINOLOGY, from your instructor. Complete the test and return it to your instructor for evaluation.

Check-Out Activity Sheets

I MEDICAL LABORATORY ABBREVIATIONS.....	6
I MEDICAL LABORATORY ABBREVIATIONS--ANSWER KEY.....	6
II MEDICAL LABORATORY TERMINOLOGY.....	6
II MEDICAL LABORATORY TERMINOLOGY--ANSWER KEY.....	6

LEARNING MEDICAL LABORATORY TERMINOLOGY

RECOMMENDED REFERENCES

Barnett, Medical Laboratory Assistant (Student's Manual). Austin, TX: Center for Occupational Curriculum Development, Division of Continuing Education, The University of Texas at Austin, 1981.

Taber's Cyclopedic Medical Dictionary. Philadelphia, PA: F.A. Davis Company, 1977.

Wittman and Thomas, Medical Laboratory Skills. St. Louis, MO: McGraw-Hill Book Company, 1977.

LEARNING MEDICAL LABORATORY TERMINOLOGY

LA#	NOTES AND SUGGESTIONS FOR INSTRUCTION	REFERENCES AND SPECIAL TOOLS AND EQUIPMENT	TEACHER'S NOTES
1	You may wish to develop and use flash cards, word games, or drills to reinforce the learning of medical laboratory abbreviations and meanings.		
2	Student Self-Check		
3	After the students have researched the definitions or descriptions of the medical laboratory terms, have them check their work using the VOCABULARY LISTING provided in this section of the manual.	RECOMMENDED REFERENCES Barnett, <u>Medical Laboratory Assistant</u> (Student's Manual). AND <u>Taber's Cyclopedic Medical Dictionary.</u> AND Wittman and Thomas, <u>Medical Laboratory Skills.</u>	
4	Student Self-Check: Provide a copy of the crossword puzzle for each student.	--Copies of the Student Self-Check II, MEDICAL LABORATORY TERMINOLOGY CROSSWORD PUZZLE. (A Master Copy is provided in this section of the manual.)	
5	You may want to display various medical lab equipment for the students to view as they read the assignment. You may want to quiz the students about the names of the basic lab equipment.	RECOMMENDED REFERENCE Wittman and Thomas, <u>Medical Laboratory Skills,</u> pp. 11-28.	

LEARNING MEDICAL LABORATORY TERMINOLOGY

LA#	NOTES AND SUGGESTIONS FOR INSTRUCTION	REFERENCES AND SPECIAL TOOLS AND EQUIPMENT	TEACHER'S NOTES
6	Provide a copy of the Check-Out Activity Sheets I and II for each student's check-out activity. Answer keys are provided in this section of the manual. Use the Instructor's Final Checklist to record each student's performance.	--Copies of Check-Out Activity Sheet I, MEDICAL LABORATORY ABBREVIATIONS, and Check-Out Activity Sheet II, MEDICAL LABORATORY TERMINOLOGY. (Master Copies and answer keys are provided in this section of the manual.) --Copies of the Instructor's Final Checklist. (A Master Copy is provided in this section of the manual.)	

VOCABULARY LISTING

URINALYSIS

1. Anuria--the absence of urine production.
2. Bilirubin--a bile pigment that causes a greenish brown urine specimen.
3. Cast--a collection of proteinlike material formed in the renal tubules and excreted in urine.
4. Clean catch--a technique for collecting an uncontaminated specimen of urine for a bacteriological study.
5. Dipstick--a commercially-prepared product for performing chemical tests on urine.
6. Diuresis--excessive urine production.
7. Jaundice--a disorder characterized by the yellow color of the skin and cornea; produced by excessive bilirubin pigment in the blood.
8. Midstream collection--a technique to collect a urine specimen during the middle of voiding.
9. Nocturia--excessive urination at night.
10. Oliguria--insufficient urine production.
11. Polyuria--excessive production of urine over a 24-hour period.
12. Refractometer--a device used to measure the specific gravity of urine.
13. Specific gravity--the weight of a volume of liquid compared to the weight of an equal volume of reference liquid.
14. Urinalysis--a chemical analysis of urine.
15. Urinometer--a small floating glass device that has a calibrated glass stem and is weighted with lead shot. It is used to measure the specific gravity of urine.
16. Urobilin--a pigment that causes urine to become orange brown.
17. Urochrome--a pigment that causes urine to be the normal yellow-to-amber color.

HEMATOLOGY

1. Albumin--A plasma protein that helps maintain the fluid balance and the osmotic balance of the blood.

2. Anemia--a condition of the blood when there is a reduced number of red blood cells or a reduced quantity of hemoglobin.
3. Band cell--an immature white blood cell.
4. Basophil--A granulocyte with basic staining blue granular cytoplasm.
5. Coulter counter--a device that is used for certain hematology tests; it is automatic.
6. Cover glass method--a technique for preparing blood smears.
7. Crenated--the shriveled appearance of a red blood cell caused by a loss of internal cellular fluid.
8. Differential--determining the percentages of the various types of white blood cells in a stained blood smear.
9. Eosinophil--a granulocyte with acid-staining red granular cytoplasm.
10. Erythrocytes--a red blood cell which functions in carrying oxygen.
11. Fibrin--the semisolid material derived from fibrinogen, which forms a clot.
12. Fibrinogen--a protein constituent of plasma involved with blood clotting.
13. Globulin--a plasma protein involved in antibody production.
14. Hemocytometer--a device used for counting cells and other small particles.
15. Hemacrit--the volume of red blood cells expressed as a percentage of whole blood in a sample.
16. Hematology--the study of the blood and its physiological characteristics.
17. Hematoma--the localized loss of blood from a vessel resulting in the formation of a clot.
18. Isotonic--a solution in which there is no osmotic pressure and the concentration of dissolved particles outside the cell is the same as the concentration inside the cell.
19. Juvenile--a cell of the granulocytic series.
20. Leukocytes--white blood cells.
21. Neutrophil--a granulocyte with neutral staining pink granular cytoplasm.
22. Petechiae--the small hemorrhagic spots which occur in tissue.

23. Phagocytosis--the process by which leukocytes protect the body from the invasion of microorganisms by engulfing, digesting, and destroying bacteria, etc.
24. Platelet--cell fragment without a nucleus which is found in blood functioning in the blood clotting process.
25. Red blood cell count--the number of red blood cells in a cubic millimeter of blood.
26. Serum--the fluid portion of blood remaining after a clot has formed.
27. Sickle cell--a banana-shaped red blood cell found in the blood of a person who has sickle cell anemia.
28. Wright's stain--a biological stain used in hematology studies.

BLOOD BANKING

1. ABO system--the method of classifying blood types as A, B, O, and AB.
2. Antisera--highly purified solutions of antibodies.
3. Blood banking--the branch of clinical medicine which processes blood for transfusion.
4. Cross match--the technique used to detect antibodies in the donor's or recipient's serum which could react with red cell antigens to produce a transfusion reaction.
5. Hemolytic--the breaking down of red blood cells.
6. Universal donor--an individual having group O blood cells and lacking other blood group antigens.
7. Universal recipient--an individual lacking anti-A and anti-B agglutinins and having group AB blood.

SEROLOGY

1. Agglutination--the clumping of blood corpuscles when incompatible bloods are mixed.
2. Antibody--a natural or immune substance which destroys or reacts with a specific antigen entering the body.
3. Antigen--a substance, usually a foreign protein, capable of stimulating antibody production when it enters the body.

4. Complement fixation--a serologic reaction involving the adsorption of complement during an antigen-antibody reaction and the lysis of red cells following the addition of excess complement.
5. Hemolysis--the destruction of red blood cells caused by a gain in internal fluid when the cells are placed in a hypotonic solution.
6. Heparin--a physiologic anticoagulant which prevents clotting by inactivating prothrombin.
7. Lipemic--the milky appearance of plasma or serum caused by the abnormal presence of fats.
8. Lysis--an antigen-antibody reaction resulting in the destruction of red blood cells or bacterial cells.
9. Precipitation--an antigen-antibody reaction resulting in the formation of a fine, granular precipitate.
10. Serology--the branch of laboratory medicine that uses the reaction between antigens and antibodies to determine the presence of pathology.
11. Serum globulin--an antibody produced in response to an antigen.
12. Titer--the amount of antibody required to react with a given amount of antigen.

CLINICAL CHEMISTRY

1. Blood urea nitrogen (BUN)--a laboratory determination of the kidney's ability to remove waste products from the blood.
2. Clinical chemistry--the branch of clinical medicine that deals with the study of body fluids and substances for the diagnosis of disease.
3. Colorimetry--the measurement of color and color variations of chemical and biological samples.
4. Electrolyte--a substance which separates into electrically charged particles in solution.
5. Homeostasis--the physiological balance of body substances and function.
6. Ion--an electrically charged atom.
7. Spectrophotometer--an electronic instrument that enables the operator to select a specific wavelength or color and pass it through a colored solution.

MICROBIOLOGY

1. Acid fast--an organism or structure which retains color after treatment with acid solutions.
2. Aerobe--a microorganism requiring oxygen to sustain life.
3. Agar--an extract of seaweed which has the property of being liquid when heated and solid when cold.
4. Anaerobe--a microorganism that is able to sustain life only in the absence of oxygen.
5. Antiseptic--an agent used to destroy or prevent the growth of pathogens on living tissues.
6. Autoclave--a specially designed chamber used for sterilization with steam under pressure.
7. Bacteriology--the study of pathogenic organisms.
8. Capsule--a slimy, gelatinous layer secreted by bacteria as a protection from natural body defense mechanisms that surrounds the cell wall and is closely associated with microbial virulence.
9. Culture medium--a synthetic preparation of organic substances, inorganic salts, vitamins, and minerals which supports the growth of bacteria.
10. Differential stain--a biological stain used to color special cell structures such as flagella, capsules, and spores.
11. Disinfectant--an agent used to remove or prevent the growth of pathogens on nonliving materials.
12. Fungi--simple plants that are capable of causing disease in people.
13. Gram's stain--a stain used to classify bacteria as gram-positive or gram-negative organisms.
14. Incubation--the interval between exposure to infection and the appearance of the first symptom.
15. Microbiology--the study of organisms too small to be seen without magnification.
16. Parasitology--the study of parasites and the diseases they cause.
17. Pathogen--a disease-producing microbe.
18. Petri dish--a flat, circular dish used to contain culture medium for bacteriologic studies.

19. Simple stain--a biological stain used to color bacteria for general observation.
20. Smear--a thin layer of bacterial or cellular material on a glass slide.
21. Stab or slant culture--a bacterial growth which results from inoculating tubed media with a single needle.

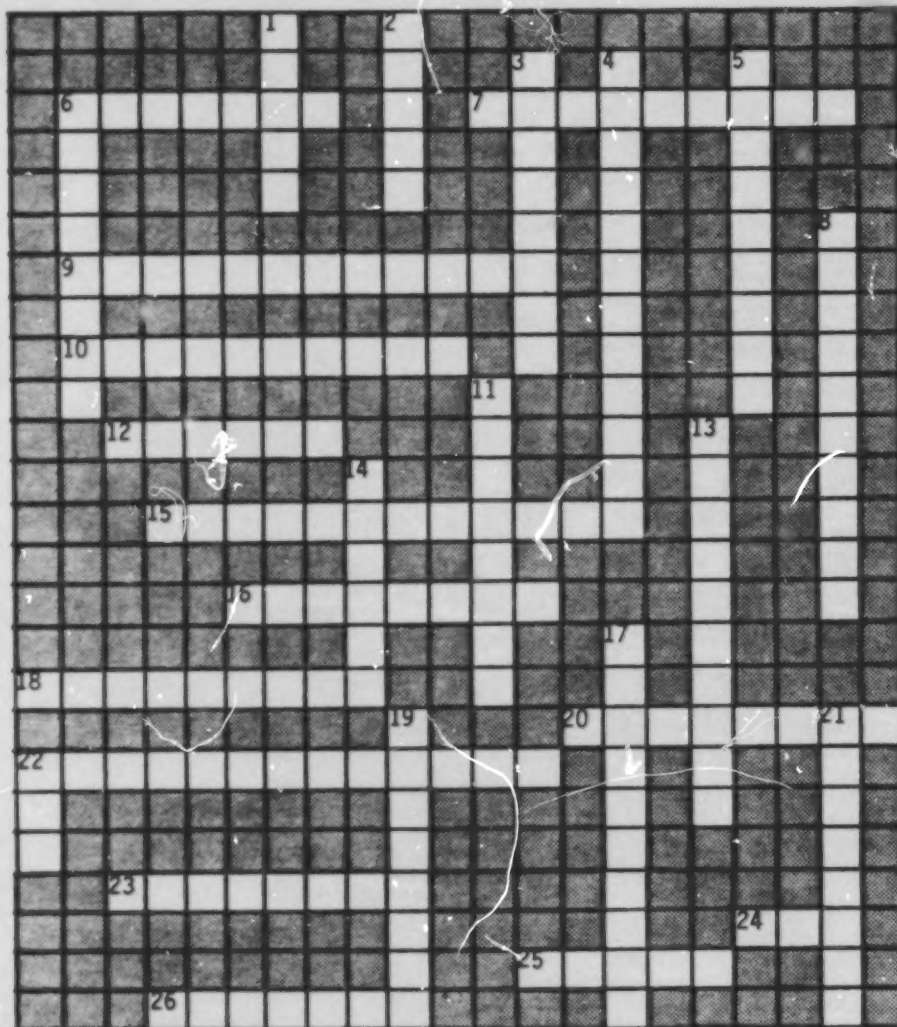
OTHER MEDICAL LABORATORY TERMS

1. Basal metabolism--the minimum amount of energy used by the body under standard test conditions.
2. Benign--a tumor not generally life-threatening.
3. Biopsy--the clinical examination of a small piece of tissue for signs of disease.
4. Cytology--the study of cells.
5. Dialysis--the separation of solution components using a selectively permeable membrane.
6. Electrocardiography--the body of knowledge and technique whereby electrical discharges from the heart are detected and used to diagnose disease.
7. Etiology--the study of the causes of disease.
8. Genotype--the genetic makeup of an individual.
9. Histology--the study of tissues.
10. Immunochemistry--the chemistry of immunization.
11. Malignant--a tumor that is generally life threatening.
12. Mycology--the study of fungi and the diseases which they cause.
13. Neoplasm--a tumor.
14. Occult blood--blood which cannot be detected by microscopic examination.
15. Pathologist--a physician who engages in the practice of laboratory medicine.
16. Pathology--the study of disease.
17. Percent solution--the concentration of a solution expressed as parts per hundred.

18. Radioisotopes--chemical substances which give off radiation.
19. Saturated solution--a solution which contains the maximum possible amount of solute.
20. Solute--a solid dissolved by a solvent.
21. Solvent--a liquid which dissolves a solid.
22. To contain pipet--a pipet that is calibrated to contain a specified volume of liquid.
23. Volume solution--the concentration expression for the dilution of two liquids.
24. Water bath--a containerlike device filled with a fluid medium and used to control the temperature of other objects or substances placed into it.
25. Weight-volume solution--the concentration for the amount of solute per unit volume.

STUDENT SELF-CHECK II

MEDICAL LABORATORY TERMINOLOGY CROSSWORD PUZZLE



CHECK-OUT ACTIVITY SHEET I

MEDICAL LABORATORY ABBREVIATIONS

Directions: Write the abbreviation for the following medical laboratory terms. When you have completed the test, give it to your instructor for evaluation.

1. Basophils
2. Electrocardiogram
3. Hematocrit
4. Hemoglobin
5. Complete blood count
6. Immediately
7. Eosinophils
8. Degrees Fahrenheit
9. Intake and output
10. Coronary care unit
11. Operating room
12. Patient
13. Red blood cell count
14. Temperature, pulse, and respiration
15. Differential count
16. Intensive care unit
17. Specific gravity
18. Venereal disease research laboratory test
19. Emergency room
20. Diagnosis

CHECK-OUT ACTIVITY SHEET I

MEDICAL LABORATORY ABBREVIATIONS

ANSWER KEY

1. basos
2. EKG
3. Hct.
4. Hgb
5. CBC
6. stat
7. eos
8. °F
9. I and O
10. CCU
11. OR
12. pt.
13. RBC
14. TPR
15. Diff
16. ICU
17. sp. gr.
18. VDRL
19. ER
20. D_x

CHECK-OUT ACTIVITY SHEET II

MEDICAL LABORATORY TERMINOLOGY

Directions: Complete the following statements. When you have finished, give your test to the instructor for evaluation.

URINALYSIS

1. _____ is the weight of a volume of liquid compared to the weight of an equal volume of reference liquid.
2. The chemical analysis of urine is called _____.
3. _____ is a disorder characterized by the yellow color of the skin and cornea.
4. The _____ is a device used to measure the specific gravity of urine.

HEMATOLOGY

5. _____ is a condition of the blood when there is a reduced number of red blood cells or a reduced quantity of hemoglobin.
6. _____ is the volume of red blood cells expressed as a percentage of whole blood in a sample.
7. _____ is the study of the blood and its physiological characteristics.
8. _____ is the branch of clinical medicine which processes blood for transfusion.
9. The _____ system is the method of classifying blood types.

SEROLOGY

10. _____ is the destruction of red blood cells caused by a gain in internal fluid when the cells are placed in a hypotonic solution.
11. _____ is the natural or immune substance which destroys or reacts with a specific antigen entering the body.

CLINICAL CHEMISTRY

12. _____ is the branch of chemical medicine that deals with the study of body fluids and substances for the diagnosis of disease.

CHECK-OUT ACTIVITY SHEET II, (page 2)

13. _____ is the measurement of color and color variations of chemical and biological samples.

MICROBIOLOGY

14. An _____ is a specially designed chamber used for sterilization with steam under pressure.
15. _____ is the study of pathogenic organisms.
16. _____ is the interval between exposure to infection and the appearance of the first symptom.
17. _____ is an agent used to remove or prevent the growth of pathogens on nonliving materials.
18. A _____ is a disease-producing microbe.

OTHER TERMS

19. A tumor that is not generally life threatening is considered _____.
20. A _____ is a clinical examination of a small piece of tissue for signs of disease.

CHECK-OUT ACTIVITY SHEET II

MEDICAL LABORATORY TERMINOLOGY

ANSWER KEY

1. Specific gravity
2. Urinalysis
3. Jaundice
4. Refractometer
5. Anemia
6. Hemocrit
7. Hematology
8. Blood banking
9. ABO
10. Hemolysis
11. Antibody
12. Clinical chemistry
13. Colorimetry
14. Autoclave
15. Bacteriology
16. Incubation
17. Disinfectant
18. Pathogen
19. Benign
20. Biopsy

INSTRUCTOR'S FINAL CHECKLIST

LEARNING MEDICAL LABORATORY TERMINOLOGY

The student should be evaluated according to the performance ratings in the box. Indicate on a separate sheet of paper whether the student's performance for each item is Fully Accomplished, Partially Accomplished, Not Accomplished, or under certain circumstances, Not Applicable.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will decide which learning activities must be repeated.

Fully Accomplished	Partially Accomplished	Not Accomplished	Not Applicable
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- (1) The student completed Check-Out Activity Sheet, MEDICAL LABORATORY ABBREVIATIONS, with 90% accuracy.....

[] [] [] [] []

- (2) The student completed Check-Out Activity Sheet, MEDICAL LABORATORY TERMINOLOGY, with 90% accuracy.....

[] [] [] [] []

PERFORMING PHYSICAL TESTS ON URINE

OBJECTIVE

Given five urine specimens, assess and record the color, transparency, odor, and specific gravity of each urine specimen. The results must correspond exactly with the instructor's previously determined results.

CONTENTS OF MODULE**Learning
Activity Number**Student Self-Check

1 PERFORMING PHYSICAL TESTS ON URINE..... 4

Instructor's Final Checklist

PERFORMING PHYSICAL TESTS ON URINE..... 5

CHECK-OUT ACTIVITY

Your instructor will give you five urine specimens. Assess and record the color, transparency, odor, and specific gravity of each specimen.

RECOMMENDED REFERENCES

Barnett, Medical Laboratory Assistant (Student's Manual). Austin, TX: Center for Occupational Curriculum Development, Division of Continuing Education, The University of Texas at Austin, 1981.

Simmers, Diversified Health Occupations. Albany, NY: Delmar Publishers, 1983.

Wittman and Thomas, Medical Laboratory Skills. St Louis, MO: McGraw-Hill Book Company, 1977.

PERFORMING PHYSICAL TESTS ON URINE

LA#	NOTES AND SUGGESTIONS FOR INSTRUCTION	REFERENCES AND SPECIAL TOOLS AND EQUIPMENT	TEACHER'S NOTES
1		RECOMMENDED REFERENCE Wittman and Thomas, <u>Medical Laboratory Skills</u> , pp. 60-62	
2		RECOMMENDED REFERENCES Wittman and Thomas, <u>Medical Laboratory Skills</u> , pp. 62-64. AND/OR Barnett, <u>Medical Laboratory Assistant</u> (Student's Manual), pp. 15-17. AND/OR <u>Simmers, Diversified Health Occupations</u> , pp. 251-253.	
3	Demonstrate physical tests on urine. Then, allow the students to assess physical properties of urine.	--Urine specimens --Urinometer --Refractometer (TS Meter) --Record pad	
4	Student Self-Check		
5	Have the students check out on performing physical tests on urine. Use the Instructor's Final Checklist to evaluate each student's performance when assessing physical properties of urine.	--Urine specimens --Urinometer --Refractometer (TS Meter) --Record pad --Copies of the Instructor's Final Checklist. (A Master Copy is provided in this section of the manual.)	

MASTER COPY

INSTRUCTOR'S FINAL CHECKLIST

PERFORMING PHYSICAL TESTS ON URINE

The student should be evaluated according to the performance ratings in the box. Indicate on a separate sheet of paper whether the student's performance for each item is Fully Accomplished, Partially Accomplished, Not Accomplished, or under certain circumstances, Not Applicable.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will decide which learning activities must be repeated.

Fully Accomplished	Partially Accomplished	Not Accomplished	Not Applicable
-----------------------	---------------------------	---------------------	-------------------

The student correctly assessed and recorded each urine specimen for:

- | | | | | |
|--------------------------|-----|-----|-----|-----|
| a. Color..... | [] | [] | [] | [] |
| b. Transparency..... | [] | [] | [] | [] |
| c. Odor..... | [] | [] | [] | [] |
| d. Specific gravity..... | [] | [] | [] | [] |

PERFORMING CHEMICAL TESTS ON URINE USING DIPSTICKS

OBJECTIVE

Given five urine specimens and the necessary supplies and equipment, test for and record the pH, glucose, protein, ketones, bilirubin, blood, and urobilinogen of each specimen using dipsticks. All the results must correspond with the supervisor's previously determined results.

CONTENTS OF MODULE

<u>Instructor's Final Checklist</u>	<u>Learning Activity Number</u>
PERFORMING CHEMICAL TESTS ON URINE USING DIPSTICKS...	6

CHECK-OUT ACTIVITY

Your instructor will give you five urine specimens. Test for and record the pH, protein, glucose, ketones, bilirubin, blood, and urobilinogen using dipsticks.

RECOMMENDED REFERENCES

Barnett, Medical Laboratory Assistant (Student's Manual). Austin, TX: Center for Occupational Curriculum Development, Division of Continuing Education, The University of Texas at Austin, 1981.

Simmers, Diversified Health Occupations. Albany, NY: Delmar Publishers, 1983.

Wittman and Thomas, Medical Laboratory Skills. St. Louis, MO: McGraw-Hill Book Company, 1977.

PERFORMING CHEMICAL TESTS ON URINE USING DIPSTICKS

LA#	NOTES AND SUGGESTIONS FOR INSTRUCTION	REFERENCES AND SPECIAL TOOLS AND EQUIPMENT	TEACHER'S NOTES
1		RECOMMENDED REFERENCES Wittman and Thomas, <u>Medical Laboratory Skills</u>, pp. 65-77. AND/OR Barnett, <u>Medical Laboratory Assistant (Student's Manual)</u>, pp. 17-18. AND/OR Simmers, <u>Diversified Health Occupations</u>, pp. 246-251.	
2	Provide an opportunity for the students to observe chemical tests on urine using dipsticks.		
3	Obtain dipstick package inserts that give directions for the use and interpretation of the dipsticks. (You may wish to quiz the student on the normal values for each chemical component found in urine.)	--Package inserts for dipsticks	
4	Obtain copies of laboratory report forms used for reporting chemical tests on urine.	--Laboratory report forms	
5	Have the students practice performing chemical test on urine using dipsticks.	--Urine specimens --Dipsticks	

PERFORMING CHEMICAL TESTS ON URINE USING DIPSTICKS

LA#	NOTES AND SUGGESTIONS FOR INSTRUCTION	REFERENCES AND SPECIAL TOOLS AND EQUIPMENT	TEACHER'S NOTES
6	Have the students check out on performing chemical tests on urine using dipsticks. Use the Instructor's Final Checklist to evaluate each student's performance.	--Urine specimens --Dipsticks --Copies of the Instructor's Final Checklist. (A Master Copy is provided in this section of the manual.)	

INSTRUCTOR'S FINAL CHECKLIST

PERFORMING CHEMICAL TESTS ON URINE USING DIPSTICKS

The student should be evaluated according to the performance ratings in the box. Indicate on a separate sheet of paper whether the student's performance for each item is Fully Accomplished, Partially Accomplished, Not Accomplished, or under certain circumstances, Not Applicable.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will decide which learning activities must be repeated.

Fully Accomplished	Partially Accomplished	Not Accomplished	Not Applicable
-----------------------	---------------------------	---------------------	-------------------

The student correctly tested and recorded each urine specimen for:

a. pH.....	[]	[]	[]	[]
b. glucose.....	[]	[]	[]	[]
c. protein.....	[]	[]	[]	[]
d. ketones.....	[]	[]	[]	[]
e. bilirubin.....	[]	[]	[]	[]
f. blood.....	[]	[]	[]	[]
g. urobilinogen.....	[]	[]	[]	[]

MAKING AND STAINING BLOOD SMEARS

NOTE TO THE INSTRUCTOR: Before completing this module, have the students review Module HS-7, "Understanding the Circulatory System" or have the students read: Wittman and Thomas, Medical Laboratory Skills, Chapter 11, pp. 100-105.

OBJECTIVES

- (1) Given three labeled whole blood specimens and the necessary supplies, use glass slides and prepare three blood smears for Wright's stain. All items on the Instructor's Final Checklist must be fully accomplished.
- (2) Given three prepared slides, stain the slides with Wright's stain. All items on the Instructor's Final Checklist must be fully accomplished.

CONTENTS OF MODULE

	<u>Learning Activity Number</u>
<u>Student Self-Check</u>	
I MAKING AND STAINING BLOOD SMEARS.....	7
<u>Instructor's Final Checklist</u>	
MAKING AND STAINING BLOOD SMEARS.....	9

CHECK-OUT ACTIVITIES

- (1) Your instructor will give you three labeled whole blood specimens. Make smears of each specimen that will be suitable for staining with Wright's stain.
- (2) Your instructor will give you three prepared slides. Stain each slide with Wright's stain.

RECOMMENDED REFERENCES

Barnett, Medical Laboratory Assistant (Student's Manual). Austin, TX: Center for Occupational Curriculum Development, Division of Continuing Education, The University of Texas at Austin, 1981.

Simmers, Diversified Health Occupations. Albany, NY: Delmar Publishers, 1983.

Wittman and Thomas, Medical Laboratory Skills. St Louis, MO: McGraw-Hill Book Company, 1977.

MAKING AND STAINING BLOOD SMEARS

LA#	NOTES AND SUGGESTIONS FOR INSTRUCTION	REFERENCES AND SPECIAL TOOLS AND EQUIPMENT	TEACHER'S NOTES
1	You may want the students to read about blood specimen collection using the recommended reference (Wittman and Thomas, <u>Medical Laboratory Skills</u> , pp. 105-109).	RECOMMENDED REFERENCE Wittman and Thomas, <u>Medical Laboratory Skills</u>, pp. 121-123. AND/OR Barnett, <u>Medical Laboratory Assistant (Student's Manual)</u>, p. 33. AND/OR Simmers, <u>Diversified Health Occupations</u>, pp. 238-240.	
2	Provide an opportunity for the students to observe the preparation of a blood smear.		
3	Have the students practice preparing a blood smear.	--Whole blood specimens --Slides --Alcohol --Lint-free cloth --Distilled water --Marking pencil	
4		RECOMMENDED REFERENCES Wittman and Thomas, <u>Medical Laboratory Skills</u>, pp. 123-124. AND/OR Barnett, <u>Medical Laboratory Assistant (Student's Manual)</u>, p. 33. AND/OR Simmers, <u>Diversified Health Occupations</u>, pp. 238-240.	

MAKING AND STAINING BLOOD SMEARS

LA#	NOTES AND SUGGESTIONS FOR INSTRUCTION	REFERENCES AND SPECIAL TOOLS AND EQUIPMENT	TEACHER'S NOTES
5	Provide an opportunity for the students to observe the staining of blood smears.		
6	Have the students practice staining blood smears.	--Prepared slides --Staining rack --Wright's stain --Gauze	
7	Student Self-Check		
8		RECOMMENDED REFERENCE Wittman and Thomas, <u>Medical Laboratory Skills</u> , pp. 124-128.	
9	(1) Have the students check out on making a blood smear. (2) Have the students check out on staining blood smears. Use the Instructor's Final Checklist to evaluate each student's performance.	--Whole blood specimens (3) --Slides --Alcohol --Lint-free cloth --Distilled water --Marking pencil --Prepared slides --Staining rack --Wright's stain --Gauze --Copies of the Instructor's Final Checklist. (A Master Copy is included in this section of the manual.)	

INSTRUCTOR'S FINAL CHECKLIST

MAKING AND STAINING BLOOD SMEARS

The student should be evaluated according to the performance ratings in the box. Indicate on a separate sheet of paper whether the student's performance for each item is Fully Accomplished, Partially Accomplished, Not Accomplished, or under certain circumstances, Not Applicable.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will decide which learning activities must be repeated.

Fully Accomplished	Partially Accomplished	Not Accomplished	Not Applicable
-----------------------	---------------------------	---------------------	-------------------

(1) In preparing blood smears, the student:

- | | | | | |
|--|-----|-----|-----|-----|
| a. Washed hands..... | [] | [] | [] | [] |
| b. Mixed the blood specimen properly.... | [] | [] | [] | [] |
| c. Placed a small drop of blood on the slide approximately 2 cm. from the edge and on the midline..... | [] | [] | [] | [] |
| d. Spread the drop using a spreader slide..... | [] | [] | [] | [] |
| e. Allowed the slide to air dry..... | [] | [] | [] | [] |
| f. Labeled the slide properly..... | [] | [] | [] | [] |

Each prepared slide:

- | | | | | |
|--|-----|-----|-----|-----|
| a. Showed a smooth gradual transition from thick to thin..... | [] | [] | [] | [] |
| b. Showed a feathered edge at the thin edge and covered no more than three-fourths of the slide..... | [] | [] | [] | [] |
| c. Did not have any streaks of blood extending beyond the thin edge..... | [] | [] | [] | [] |
| d. Showed an even distribution of cells when stained..... | [] | [] | [] | [] |
| e. Was suitable for a differential count..... | [] | [] | [] | [] |

INSTRUCTOR'S FINAL CHECKLIST, (page 2)

The student should be evaluated according to the performance ratings in the box. Indicate on a separate sheet of paper whether the student's performance for each item is Fully Accomplished, Partially Accomplished, Not Accomplished, or under certain circumstances, Not Applicable.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will decide which learning activities must be repeated.

Fully Accomplished	Partially Accomplished	Not Accomplished	Not Applicable
-----------------------	---------------------------	---------------------	-------------------

(2) In staining the slides, the student:

- | | | | | |
|---|-----|-----|-----|-----|
| a. Placed each slide on the staining rack properly..... | [] | [] | [] | [] |
| b. Covered each smear completely with Wright's stain..... | [] | [] | [] | [] |
| c. Did not allow the stain to dry out... | [] | [] | [] | [] |
| d. Applied the buffer properly..... | [] | [] | [] | [] |
| e. Blew on each slide properly..... | [] | [] | [] | [] |
| f. Washed the slides properly..... | [] | [] | [] | [] |
| g. Air dried the slides..... | [] | [] | [] | [] |
| h. Timed each step of the procedure properly..... | [] | [] | [] | [] |

The stained slides:

- | | | | | |
|--|-----|-----|-----|-----|
| a. Did not show any precipitated stain..... | [] | [] | [] | [] |
| b. Had red blood cells stained orange-red..... | [] | [] | [] | [] |
| c. Had platelets stained violet to purple..... | [] | [] | [] | [] |
| d. Had lymphocytes and neutrophils with dark purple nuclei with monocytic nuclei a lighter purple..... | [] | [] | [] | [] |
| e. Had eosinophils with bright orange granules and basophils with dark blue granules..... | [] | [] | [] | [] |
| f. Had cytoplasm of all leukocytes stained the standard color and shades..... | [] | [] | [] | [] |

RECOMMENDED REFERENCES LISTING FOR THE MEDICAL LABORATORY AIDE MODULES

On the following pages, you will find a listing of the recommended references for the medical laboratory aide modules. These references are listed by module number and by learning activity number. The assigned readings must be posted for the students to use when they are going through the modules.

You may add additional readings to the listing or you may make substitutions. Where a recommended reference is specified, the student must often read the pages specified in order to be able to check out of the module. This is especially true when the check-out activity is a written test that is built around information provided in the module and in the specified pages of the recommended references. Be sure to develop the written test based on the information you require the students to read.

Additional references may also be suggested in the Instructor's Guide Sheets. They may provide complementary information at a more in-depth level or on a more basic level. You should determine which of the additional references you have available and post assignments according to the needs of your students. Either add the references to the RECOMMENDED REFERENCES LISTING. . . as additional readings or make a supplementary listing to post.

MEDICAL LABORATORY AIDE MODULES

MODULE NUMBER	LA #	RECOMMENDED REFERENCES/AV MATERIALS
HS-ML-1	1	TOPIC: The clinical laboratory team Wittman and Thomas, <u>Medical Laboratory Skills</u>, pp. 6-10.
HS-ML-2	3	TOPIC: Definitions or descriptions of medical laboratory terminology Barnett, <u>Medical Laboratory Assistant</u> (Student's Manual). AND <u>Taber's Cyclopedic Medical Dictionary</u>. AND Wittman and Thomas, <u>Medical Laboratory Skills</u>.
	5	TOPIC: Basic laboratory equipment Wittman and Thomas, <u>Medical Laboratory Skills</u>, pp. 11-28.
HS-ML-3	1	TOPIC: The physical properties of urine--volume, color, transparency, odor, and specific gravity Wittman and Thomas, <u>Medical Laboratory Skills</u>, pp. 60-62.
	2	TOPIC: Physical tests on urine using the urinometer and the refractometer (TS meter) Wittman and Thomas, <u>Medical Laboratory Skills</u>, pp. 62-64. AND/OR Barnett, <u>Medical Laboratory Assistant</u> (Student's Manual), pp. 15-17. AND/OR

MEDICAL LABORATORY AIDE MODULES

MODULE NUMBER	LA #	RECOMMENDED REFERENCES/AV MATERIALS
HS-ML-3	2	Simmers, <u>Diversified Health Occupations</u> , pp. 251-253.
HS-ML-4	1	TOPIC: Chemical tests on urine Wittman and Thomas, <u>Medical Laboratory Skills</u>, pp. 65-77. AND/OR Barnett, <u>Medical Laboratory Assistant</u> (Student's Manual), pp. 17-18. AND/OR Simmers, <u>Diversified Health Occupations</u>, pp. 246-251.
HS-ML-5	1	TOPIC: The preparation of a blood smear Wittman and Thomas, <u>Medical Laboratory Skills</u>, pp. 121-123. AND/OR Barnett, <u>Medical Laboratory Assistant</u> (Student's Manual), p. 33. AND/OR Simmers, <u>Diversified Health Occupations</u>, pp. 238-240.
	4	TOPIC: Staining blood smears Wittman and Thomas, <u>Medical Laboratory Skills</u>, pp. 123-124. AND/OR Barnett, <u>Medical Laboratory Assistant</u> (Student's Manual), p. 33. AND/OR

MEDICAL LABORATORY AIDE MODULES

MODULE NUMBER	LA #	RECOMMENDED REFERENCES/AV MATERIALS
HS-ML-5	4	Simmers, <u>Diversified Health Occupations</u> , pp. 238-240.
	8	TOPIC: The examination of blood smears Wittman and Thomas, <u>Medical Laboratory Skills</u> , pp. 124-128.

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HEALTH SERVICES: CLINICAL
MEDICAL LABORATORY AIDE
INSTRUCTOR'S PACKAGE
MODULES HS-ML 1-5

STUDENT PACKAGE

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Health Services: Clinical

LEARNING ABOUT MEDICAL LABORATORY CAREERS

INTRODUCTION

Careers in the medical laboratory are highly specialized. In this module, you will learn about the different career opportunities available in the medical laboratory field.

DIRECTIONS

Read the objective below. If you think that you are already able to perform the task, read the Check-Out Activity on the back cover. Then either arrange with your instructor about doing the Check-Out Activity,

or

If you need to complete learning activities in order to be able to do the task, find the Learning Activities inside this module and go through them in the order in which they are listed.

OBJECTIVE

Given a test about medical laboratory careers, answer the questions. The test must be completed with 100% accuracy.

LEARNING ACTIVITIES

1. READ about the clinical laboratory team using the reference provided by your instructor.
(or) _____
2. COMPLETE Instruction Sheet I, MEDICAL LABORATORY CAREERS, using the reference(s) provided by your instructor.
(or) _____
3. READ Instruction Sheet II, THE ACCREDITING AGENCY FOR MEDICAL LABORATORY CAREERS.
(or) _____
4. COMPLETE Student Self-Check I, MEDICAL LABORATORY CAREERS.
5. ARRANGE with your instructor to complete this module by going through the CHECK-OUT ACTIVITY listed on the back cover.

INSTRUCTION SHEET I

MEDICAL LABORATORY CAREERS

Directions: Research the information needed to complete the chart about medical laboratory careers. Use the reference(s) provided by your instructor. After you have completed your research, check your answers against those provided by your instructor.

MEDICAL LABORATORY CAREERS		
CAREER	EDUCATIONAL REQUIREMENTS	LABORATORY RESPONSIBILITIES
Medical technologist		
Medical laboratory technician		
Cytotechnologist		
Histologic technician		
Medical (or clinical) laboratory assistant		

INSTRUCTION SHEET 1, (page 2)

MEDICAL LABORATORY CAREERS		
CAREER	EDUCATIONAL REQUIREMENTS	LABORATORY RESPONSIBILITIES
Medical laboratory aide	--Usually trained at an educational level below that of the junior or community college (vocational technical school training).	--Performs such routine tasks as assisting in the maintenance of laboratory equipment, requisitioning supplies, maintaining inventory, and sterilizing equipment and instruments. --May assist in the preparation of solutions, cultural media, and biological stains. --May receive and deliver lab specimens and requisitions. --Assists with recordkeeping. --Takes messages.

INSTRUCTION SHEET II

THE ACCREDITING AGENCY FOR MEDICAL LABORATORY CAREERS

The main responsibility of medical laboratory personnel is to assist physicians by performing diagnostic tests on patients' blood, tissues, and body fluids using precise instruments, such as microscopes and chemistry analyzers. Some of the medical laboratory personnel need to have credentials for their occupations. The Board of Registry of the American Society of Clinical Pathologists (ASCP) is the national accrediting agency for medical technologists, medical laboratory technicians, cytotechnologists, and histologic technicians. If these medical laboratory personnel pass the certification examination and meet the other requirements of the Board of Registry, they are entitled to use the letters for their credentials after their name:

Medical technologist -- MT (ASCP)
Medical laboratory technician -- MLT (ASCP)
Cytotechnologist -- CT (ASCP)
Histologic technician -- HT (ASCP)

STUDENT SELF-CHECK I

MEDICAL LABORATORY CAREERS

Directions: On a separate sheet of paper, match the terms in Column I with the correct description in Column II. Check your answers with those provided on page 7.

COLUMN I

1. Medical technologist
2. Histologic technician
3. Cytotechnologist
4. Medical laboratory assistant
5. Medical laboratory technician
6. American Society of Clinical Pathologists

COLUMN II

- A. The major accrediting agency for medical laboratory personnel.
- B. Performs microscopic examinations of cells and tissues for the presence of cancer.
- C. Performs tests of a basic and routine nature under the supervision of a pathologist or medical technologist.
- D. Prepares a wide variety of tissues for microscopic examination by the pathologist.
- E. Usually requires four years of senior college training.
- F. Generally requires two years of community college or junior college training.

STUDENT SELF-CHECK I

MEDICAL LABORATORY CAREERS

ANSWER KEY

1. E
2. D
3. B
4. C
5. F
6. A

INSTRUCTOR'S FINAL CHECKLIST

LEARNING ABOUT MEDICAL LABORATORY CAREERS

The student should be evaluated according to the performance ratings in the box. Indicate on a separate sheet of paper whether the student's performance for each item is Fully Accomplished, Partially Accomplished, Not Accomplished, or under certain circumstances, Not Applicable.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will decide which learning activities must be repeated.

Fully Accomplished	Partially Accomplished	Not Accomplished	Not Applicable
-----------------------	---------------------------	---------------------	-------------------

The student completed Check-Out Activity Sheet,
MEDICAL LABORATORY CAREERS, with 100%
accuracy.....

[] [] [] [] [] []

CHECK-OUT ACTIVITY

The statements below explain the activity you must be able to complete in order to finish this module. As you go through the activity, your instructor will rate your performance using the Instructor's Final Checklist, LEARNING ABOUT MEDICAL LABORATORY CAREERS.

Obtain a copy of the Check-Out Activity Sheet, MEDICAL LABORATORY CAREERS, from your instructor. Complete the test and return it to your instructor for evaluation.

Health Services: Clinical

LEARNING MEDICAL LABORATORY TERMINOLOGY.

INTRODUCTION

In order to function effectively in a medical laboratory, it is necessary to know and understand commonly used terms and abbreviations. In this module, you will learn medical laboratory terminology.

DIRECTIONS

Read the objectives below. If you think that you are already able to perform these tasks, read the Check-Out Activities on the back cover. Then either arrange with your instructor about doing the Check-Out Activities,

or

If you need to complete learning activities in order to be able to do the tasks, find the Learning Activities inside this module and go through them in the order in which they are listed.

OBJECTIVES

- (1) Given a list of medical laboratory abbreviations and definitions or descriptions, match each meaning with the correct abbreviation. The test must be completed with 90% accuracy.
- (2) Given a list of medical laboratory definitions or descriptions, write the correct word or term for each definition or description. The test must be completed with 90% accuracy.

LEARNING ACTIVITIES

1. READ Instruction Sheet I, MEDICAL LABORATORY ABBREVIATIONS.
(or) _____
2. CHECK YOUR KNOWLEDGE of abbreviations by completing Student Self-Check I, MEDICAL LABORATORY ABBREVIATIONS.
3. RESEARCH the definitions or descriptions for the terms listed on Instruction Sheet I, MEDICAL LABORATORY TERMINOLOGY, using the reference(s) provided by your instructor.
(or) _____
4. CHECK YOUR KNOWLEDGE of laboratory terminology by completing Student Self-Check II, MEDICAL LABORATORY TERMINOLOGY CROSSWORD PUZZLE.
5. READ about basic laboratory equipment using the reference provided by your instructor.
(or) _____
6. ARRANGE with your instructor to complete this module by going through the CHECK-OUT ACTIVITIES listed on the back cover.

INSTRUCTION SHEET I

MEDICAL LABORATORY ABBREVIATIONS

Various medical laboratory terms and phrases have been abbreviated to save time in writing down instructions. In order to be able to read instructions and procedures in the medical laboratory, it is very important for you to know some of the commonly used abbreviations and their meanings. Read and study the following medical laboratory abbreviations.

<u>ABBREVIATION</u>	<u>MEANING</u>
Ag	--Silver.
ASO titer test	--Antistreptolysin O titer test.
Ba	--Barium.
basos	--Basophils.
BUN	--Blood urea nitrogen.
°C	--Degree centigrade (Celsius).
Ca	--Calcium.
CBC	--Complete blood count.
cc	--Cubic centimeters.
CCU	--Coronary care unit.
CL ₂	--Chloride.
CNS	--Central nervous system.
CO	--Carbon monoxide.
CO ₂	--Carbon dioxide.
CO ₃	--Carbonate.
CRP	--C-reactive protein.
CSF	--Cerebrospinal fluid.
CVA	--Cerebrovascular accident.
Diff	--Differential count.
D _x	--Diagnosis.
EDTA	--A type of anti-coagulant.

INSTRUCTION SHEET 1, (page 2)

EKG	--Electrocardiogram.
eos	--Eosinophils.
ER	--Emergency room.
°F	--Degree Fahrenheit.
FBS	--Fasting blood sugar.
Fe	--Iron.
GI	--Gastrointestinal.
gm.	--Gram.
H	--Hydrogen.
Hct.	--Hematocrit.
Hg	--Mercury.
Hgb	--Hemoglobin.
H ₂ O	--Water.
I and O	--Intake and output.
ICU	--Intensive care unit.
IV	--Intravenous.
K	--Potassium.
lab.	--Laboratory.
LE cell	--Lupus erythematosus cell.
lymphs	--Lymphocytes.
mEq.	--Milliequivalent.
mg	--Milligram.
Mg	--Magnesium.
ml	--Milliliter.
mm	--Millimeter.

INSTRUCTION SHEET 1, (page 3)

monos	--Monocytes.
Na	--Sodium.
no.	--Number.
n.p.o.	--Nothing by mouth.
OB	--Obstetrics.
OH	--Hydroxide.
OR	--Operating room.
O ₂	--Oxygen.
Pb	--Lead.
peds	--Pediatrics.
pH	--The unit that describes the acidity or alkalinity of a solution.
p.o.	--By mouth.
PO ₄	--Phosphate.
postop	--Postoperative.
preop	--Preoperative.
pt.	--Patient.
P.T.	--Physical therapy.
qns	--Quantity not sufficient.
RBC	--Red blood cell count.
sed. rate	--Sedimentation rate.
segs	--Segmented neutrophils.
SGOT	--Serum glutamic-oxaloacetic transaminase.
sp. gr.	--Specific gravity.

INSTRUCTION SHEET 1, (page 4)

stat	--Immediately.
TB	--Tuberculosis.
TPR	--Temperature, pulse, respiration.
URI	--Upper respiratory infection.
VDRL test	--Venereal Disease Research Laboratory test for syphilis.
WBC	--White blood cell count.

STUDENT SELF-CHECK I

MEDICAL LABORATORY ABBREVIATIONS

Directions: On a separate sheet of paper, write the abbreviation for each term. Check your work by comparing your answers with those provided on page 17.

1. Specific gravity
2. White blood cell count
3. Hematocrit
4. Red blood cell count
5. Hemoglobin
6. Blood urea nitrogen
7. Carbon dioxide
8. Carbon monoxide
9. Fasting blood sugar
10. Milliequivalent

INSTRUCTION SHEET II

MEDICAL LABORATORY TERMINOLOGY

Directions: Research the definitions or descriptions of the terms in the following categories using the reference(s) provided by your instructor. Write the terms and the definitions on a separate sheet of paper. Check your definitions or descriptions with those on a vocabulary listing provided by your instructor.

URINALYSIS

1. Anuria
2. Bilirubin
3. Cast
4. Clean catch
5. Dipstick
6. Diuresis
7. Jaundice
8. Midstream collection
9. Nocturia
10. Oliguria
11. Polyuria
12. Refractometer
13. Specific gravity
14. Urinalysis
15. Urinometer
16. Urobilin
17. Urochrome

HEMATOLOGY

1. Albumin
2. Anemia

INSTRUCTION SHEET 11, (page 2)

3. Band cell
4. Basophil
5. Coulter counter
6. Cover glass method
7. Crenated
8. Differential
9. Eosinophil
10. Erythrocytes
11. Fibrin
12. Globulin
14. Hemacytometer
15. Hematocrit
16. Hematology
17. Hematoma
18. Isotonic
19. Juvenile
20. Leukocytes
21. Neutrophil
22. Petechiae
23. Phagocytosis
24. Platelet
25. Rcd blood cell count
26. Serum
27. Sickle cell
28. Wright's stain.

INSTRUCTION SHEET II, (page 3)

BLOOD BANKING

1. ABO system
2. Antisera
3. Blood banking
4. Cross match
5. Hemolytic
6. Universal donor
7. Universal recipient

SEROLOGY

1. Agglutination
2. Antibody
3. Antigen
4. Complement fixation
5. Hemolysis
6. Heparin
7. Lipemic
8. Lysis
9. Precipitation
10. Serology
11. Serum globulin
12. Titer

CLINICAL CHEMISTRY

1. Blood urea nitrogen (BUN)
2. Clinical chemistry

INSTRUCTION SHEET II, (page 4)

3. Colorimetry
4. Electrolyte
5. Homeostasis
6. Ion
7. Spectrophotometer

MICROBIOLOGY

1. Acid fast
2. Aerobe
3. Agar
4. Anaerobe
5. Antiseptic
6. Autoclave
7. Bacteriology
8. Capsule
9. Culture medium
10. Differential stain
11. Disinfectant
12. Fungi
13. Gram's stain
14. Incubation
15. Microbiology
16. Parasitology
17. Pathogen
18. Petri dish

INSTRUCTION SHEET II, (page 5)

19. Simple stain
20. Smear
21. Stab or slant culture

OTHER MEDICAL LABORATORY TERMS

1. Basal metabolism
2. Benign
3. Biopsy
4. Cytology
5. Dialysis
6. Electrocardiography
7. Etiology
8. Genotype
9. Histology
10. Immunochemistry
11. Malignant
12. Mycology
13. Neoplasms
14. Occult blood
15. Pathologist
16. Pathology
17. Percent solution
18. Radioisotopes
19. Saturated solution
20. Solute

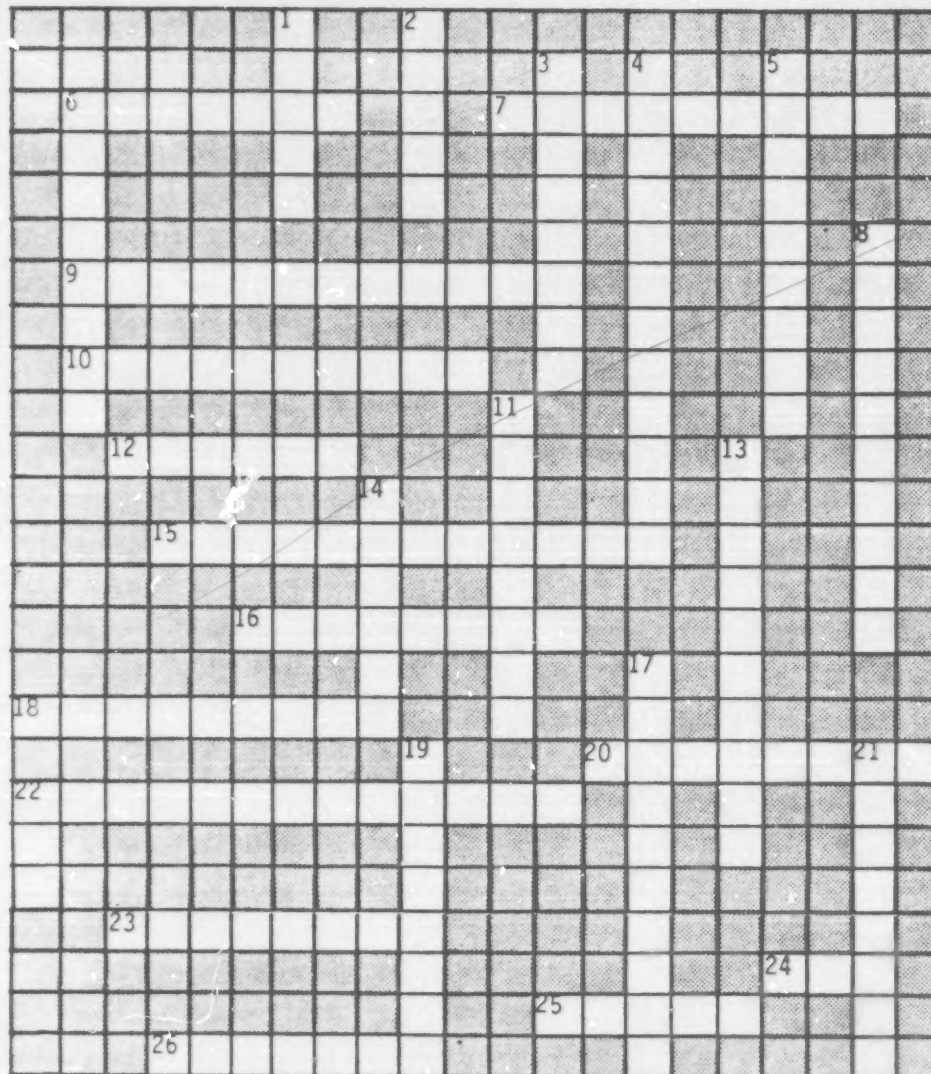
INSTRUCTION SHEET II, (page 6)

- 21. Solvent
- 22. To contain pipet
- 23. Volume solution
- 24. Water bath
- 25. Weight-volume solution

STUDENT SELF-CHECK II

MEDICAL LABORATORY TERMINOLOGY
CROSSWORD PUZZLE

Directions: Obtain a copy of this crossword puzzle from your instructor. Use the words suggested by the following statements to complete the puzzle. Check your answers against those provided on pages 18-19.



STUDENT SELF-CHECK II, (page 2)

ACROSS

6. A substance capable of stimulating antibody production.
7. Life-threatening tumor.
9. The branch of clinical medicine which processes blood for transfusion.
10. Determining the percentages of the various types of white blood cells in a strained blood smear.
12. A tumor that is not generally life threatening.
15. The study of parasites and the diseases they cause.
16. A tumor.
18. The study of tissues.
20. A commercially-prepared product for performing chemical tests on urine.
22. A device used to measure the specific gravity of urine.
23. _____ chemistry is the branch of chemical medicine that deals with the study of body fluids and substances for the diagnosis of disease.
24. The system of classifying blood types as A, B, O, and AB.
25. A _____ catch is a term which refers to a technique for collecting an uncontaminated specimen of urine for a bacteriology study.
26. The weight of a volume of liquid compared to the weight of an equal volume of reference liquid.

DOWN

1. A thick layer of bacterial or cellular material on a glass slide.
2. The fluid portion of blood remaining after a clot has formed.
3. A disease-producing microbe.
4. The study of organisms too small to be seen without magnification.
5. The study of disease.

STUDENT SELF-CHECK II, (page 3)

6. A natural or immune substance which destroys or reacts with a specific antigen entering the body.
8. The study of blood and its physiological characteristics.
11. The separation of solution components using a selectively permeable membrane.
13. A chemical analysis of urine.
14. The clinical examination of a small piece of tissue for signs of disease.
17. A small floating glass device that is calibrated for measuring the specific gravity of urine.
19. The branch of laboratory medicine that uses the reaction between antigens and antibodies to determine the presence of pathology.
21. The study of cells.
22. The abbreviation for erythrocytes.

STUDENT SELF-CHECK I

MEDICAL LABORATORY ABBREVIATIONS

ANSWER KEY

1. sp. gr.
2. WBC
3. Hct.
4. RBC
5. Hgb
6. BUN
7. CO₂
8. CO
9. FBS
10. mEq.

STUDENT SELF-CHECK II

MEDICAL LABORATORY TERMINOLOGY CROSSWORD PUZZLE

ANSWER KEY

ACROSS

- 6. Antigen
- 7. Malignant
- 9. Blood banking
- 10. Differential
- 12. Benign
- 15. Parasitology
- 16. Neoplasm
- 18. Histology
- 20. Dipstick
- 22. Refractometer
- 23. Clinical
- 24. ABO
- 15. Clean
- 26. Gravity

DOWN

- 1. Smear
- 2. Serum
- 3. Pathogen
- 4. Microbiology
- 5. Pathology
- 6. Antibody
- 8. Hematology

STUDENT SELF-CHECK II, (page 2)

ANSWER KEY

- 11. Dialysis
- 13. Urinalysis
- 14. Biopsy
- 17. Urinometer
- 19. Serology
- 21. Cytology
- 22. RBC

INSTRUCTOR'S FINAL CHECKLIST

LEARNING MEDICAL LABORATORY TERMINOLOGY

The student should be evaluated according to the performance ratings in the box. Indicate on a separate sheet of paper whether the student's performance for each item is Fully Accomplished, Partially Accomplished, Not Accomplished, or under certain circumstances, Not Applicable.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will decide which learning activities must be repeated.

Fully Accomplished	Partially Accomplished	Not Accomplished	Not Applicable
-----------------------	---------------------------	---------------------	-------------------

- (1) The student completed Check-Out Activity Sheet, MEDICAL LABORATORY ABBREVIATIONS, with 90% accuracy..... [] [] [] [] []
- (2) The student completed Check-Out Activity Sheet, MEDICAL LABORATORY TERMINOLOGY, with 90% accuracy..... [] [] [] [] []

CHECK-OUT ACTIVITIES

The statements below explain the activities you must be able to complete in order to finish this module. As you go through each activity, your instructor will rate your performance using the Instructor's Final Checklist, LEARNING MEDICAL LABORATORY TERMINOLOGY.

- (1) Obtain a copy of the Check-Out Activity Sheet I, MEDICAL LABORATORY ABBREVIATIONS, from your instructor. Complete the test and return it to your instructor for evaluation.
- (2) Obtain a copy of the Check-Out Activity Sheet II, MEDICAL LABORATORY TERMINOLOGY, from your instructor. Complete the test and return it to your instructor for evaluation.

Health Services: Clinical

PERFORMING PHYSICAL TESTS ON URINE

INTRODUCTION

The first step of a complete urinalysis is the assessment of urine for its physical properties. These physical properties usually include color, transparency, odor, and specific gravity. In this module, you will learn how to assess the physical properties of urine.

DIRECTIONS

Before you start to work on this module, be sure you have completed Module HS-ML-2, "Learning Medical Laboratory Terminology." Then, read the objective below. If you think that you are already able to perform the task, read the Check-Out Activity on the back cover. Then either arrange with your instructor about doing the Check-Out Activity,

or

If you need to complete learning activities in order to be able to do the task, find the Learning Activities inside this module and go through them in the order in which they are listed.

OBJECTIVE

Given five urine specimens, assess and record the color, transparency, odor, and specific gravity of each urine specimen. The results must correspond exactly with the instructor's previously determined results.

LEARNING ACTIVITIES

1. READ and STUDY about the physical properties of urine--volume, color, transparency, odor, and specific gravity--using the reference(s) provided by your instructor.

(or) _____

2. READ about physical tests on urine using the urinometer and the refractometer (TS meter) in the reference(s) provided by your instructor.

(or) _____

3. OBSERVE your instructor perform physical tests on urine. Then, PRACTICE assessing urine specimens for color, transparency, odor, and specific gravity.

(or) _____

4. COMPLETE Student Self-Check 1, PERFORMING PHYSICAL TESTS ON URINE.

5. ARRANGE with your instructor to complete this module by going through the CHECK-OUT ACTIVITY listed on the back cover.

STUDENT SELF-CHECK I

PERFORMING PHYSICAL TESTS ON URINE

Directions: Answer the following questions on a separate sheet of paper. Check your answers with those provided on page 4.

1. What are the physical properties of urine?
2. The normal range of specific gravity (sp. gr.) for healthy patients is _____ to _____.
3. _____ are small floating glass devices that have a calibrated (1.000 to 1.045) glass stem and are weighted with lead shot.
4. The _____ requires only a few drops of urine as compared to 15 ml needed for measuring the specific gravity of urine in the _____.
5. List five precautions that must be observed in order to get an accurate specific gravity reading using the urinometer.

STUDENT SELF-CHECK I

PERFORMING PHYSICAL TESTS ON URINE

ANSWER KEY

1. --the measurement of volume
 --color
 --transparency
 --odor
 --specific gravity
2. 1.015 to 1.025
3. Urinometer
4. Refractometer
5. Any five of the following:
 - Clean the equipment thoroughly before use.
 - Avoid the formation of bubbles around the urinometer.
 - Make sure that the stem is not wet above the water line.
 - Make sure the urinometer floats above the bottom and clears the side of the cylinder wall.
 - Read the urinometer on a flat, level surface.
 - Read the specific gravity at the bottom of the meniscus.
 - Read the urinometer at eye level.
 - Check the calibration daily for accuracy. Use distilled water.
 - Clean and dry the urinometer before storing.

INSTRUCTOR'S FINAL CHECKLIST

PERFORMING PHYSICAL TESTS ON URINE

The student should be evaluated according to the performance ratings in the box. Indicate on a separate sheet of paper whether the student's performance for each item is Fully Accomplished, Partially Accomplished, Not Accomplished, or under certain circumstances, Not Applicable.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will decide which learning activities must be repeated.

Fully Accomplished	Partially Accomplished	Not Accomplished	Not Applicable
-----------------------	---------------------------	---------------------	-------------------

The student correctly assessed and recorded each urine specimen for:

- | | | | | |
|--------------------------|-----|-----|-----|-----|
| a. Color..... | [] | [] | [] | [] |
| b. Transparency..... | [] | [] | [] | [] |
| c. Odor..... | [] | [] | [] | [] |
| d. Specific gravity..... | [] | [] | [] | [] |

CHECK-OUT ACTIVITY

The statements below explain the activity you must be able to complete in order to finish this module. After you go through the activity, your instructor will rate your performance using the Instructor's Final Checklist: **PERFORMING PHYSICAL TESTS ON URINE.**

Your instructor will give you five urine specimens. Assess and record the color, transparency, odor, and specific gravity of each specimen.

Health Services: Clinical

PERFORMING CHEMICAL TESTS ON URINE USING DIPSTICKS

INTRODUCTION

The determination of the chemical components of urine constitutes another section of a routine urinalysis. In this module, you will learn how to test urine for pH, glucose, protein, ketones, bilirubin, blood, and urobilinogen using dipsticks.

DIRECTIONS

Before you start to work on this module, be sure you have completed Module HS-ML-2, "Learning Medical Terminology" and Module HS-ML-3, "Performing Physical Tests on Urine." Then, read the objective below. If you think that you are already able to perform the task, read the Check-Out Activity on the back cover. Then either arrange with your instructor about doing the Check-Out Activity,

or

If you need to complete learning activities in order to be able to do the task, find the Learning Activities inside this module and go through them in the order in which they are listed.

OBJECTIVE

Given five urine specimens and the necessary supplies and equipment, test for and record pH, glucose, protein, ketones, bilirubin, blood, and urobilinogen of each specimen using dipsticks. All the results must correspond with the instructor's previously determined results.

LEARNING ACTIVITIES

1. READ and STUDY about chemical tests on urine in the reference(s) provided by your instructor.
(or) _____
2. OBSERVE chemical tests being performed on urine in your clinical facility.
(or) _____
3. OBTAIN package inserts for the dipsticks used in your laboratory. READ the package inserts for directions on how to use the dipsticks.
(or) _____
4. OBTAIN and STUDY the laboratory report forms used in your laboratory for reporting chemical tests on urines.
(or) _____
5. PRACTICE performing chemical tests on urine.
6. ARRANGE with your instructor to complete this module by going through the CHECK-OUT ACTIVITY listed on the back cover.

INSTRUCTOR'S FINAL CHECKLIST

PERFORMING CHEMICAL TESTS ON URINE USING DIPSTICKS

The student should be evaluated according to the performance ratings in the box. Indicate on a separate sheet of paper whether the student's performance for each item is Fully Accomplished, Partially Accomplished, Not Accomplished, or under certain circumstances, Not Applicable.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will decide which learning activities must be repeated.

Fully Accomplished	Partially Accomplished	Not Accomplished	Not Applicable
-----------------------	---------------------------	---------------------	-------------------

The student correctly tested and recorded each urine specimen for:

a. pH.....	[]	[]	[]	[]
b. glucose.....	[]	[]	[]	[]
c. protein.....	[]	[]	[]	[]
d. ketones.....	[]	[]	[]	[]
e. bilirubin.....	[]	[]	[]	[]
f. blood.....	[]	[]	[]	[]
g. urobilinogen.....	[]	[]	[]	[]

CHECK-OUT ACTIVITY

The statements below explain the activity you must be able to complete in order to finish this module. After you go through the activity, your instructor will rate your performance using the Instructor's Final Checklist, PERFORMING CHEMICAL TESTS ON URINE USING DIPSTICKS.

Your instructor will give you five urine specimens. Test for and record the pH, protein, glucose, ketones, bilirubin, blood, and urobilinogen using dipsticks.

Health Services: Clinical

MAKING AND STAINING BLOOD SMEARS

INTRODUCTION

A blood smear is one of the most important examinations made in the hematology lab. It is always included as a part of a complete blood count (CBC). In this module, you will learn how to make blood smears and how to stain them for a differential count using Wright's stain.

DIRECTIONS

Before you start to work on this module, review Module HS-7, "Understanding the Circulatory System," and HS-8, "Understanding the Blood." Also, be sure you have completed Module HS-ML-2, "Learning Medical Laboratory Terminology." Then, read the objectives below. If you think that you are already able to perform these tasks, read the Check-Out Activities on the back cover. Then either arrange with your instructor about doing the Check-Out Activities,

or

If you need to complete learning activities in order to be able to do the tasks, find the Learning Activities inside this module and go through them in the order in which they are listed.

OBJECTIVES

- (1) Given three labeled whole blood specimens and the necessary supplies, use glass slides and prepare three blood smears for Wright's stain. All items on the Instructor's Final Checklist must be fully accomplished.
- (2) Given three prepared slides, stain the slides with Wright's stain. All items on the Instructor's Final Checklist must be fully accomplished.

LEARNING ACTIVITIES

1. READ and STUDY about the preparation of a blood smear using the reference(s) provided by your instructor.
(or) _____
2. OBSERVE the preparation of a blood smear.
(or) _____
3. PRACTICE preparing a blood smear.
4. READ and STUDY about staining blood smears using the reference(s) provided by your instructor.
(or) _____
5. OBSERVE the staining of blood smears.
(or) _____
6. PRACTICE staining blood smears.
7. COMPLETE Student Self-Check 1, MAKING AND STAINING BLOOD SMEARS.
8. READ about the examination of blood smears using the reference provided by your instructor.
(or) _____
9. ARRANGE with your instructor to complete this module by going through the CHECK-OUT ACTIVITIES listed on the back cover.

STUDENT SELF-CHECK I

MAKING AND STAINING BLOOD SMEARS

Directions: Answer the following questions on a separate sheet of paper. Check your answers against those provided on page 4.

1. A _____ is always included as part of a complete blood count.
2. All slides used in making blood smears must be _____.
3. List four characteristics of a good blood smear.
4. (True or False) Blood smears must be thoroughly dry before they can be stained.
5. _____ stain is most frequently used to stain blood smears.

STUDENT SELF-CHECK I

MAKING AND STAINING BLOOD SMEARS

ANSWER KEY

1. Blood smear
2. Clean
3. Any four of the following:
 - Show a gradual transition from thick to thin.
 - Has no waves, holes, or clots appearing in the smear.
 - Has a thin edge that terminates with a feather edge.
 - Does not occupy the full length of the slide.
 - Has no streaks of blood extending beyond the feather edge.
4. True
5. Wright's

INSTRUCTOR'S FINAL CHECKLIST

MAKING AND STAINING BLOOD SMEARS

The student should be evaluated according to the performance ratings in the box. Indicate on a separate sheet of paper whether the student's performance for each item is Fully Accomplished, Partially Accomplished, Not Accomplished, or under certain circumstances, Not Applicable.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will decide which learning activities must be repeated.

Fully Accomplished	Partially Accomplished	Not Accomplished	Not Applicable
-----------------------	---------------------------	---------------------	-------------------

(1) In preparing blood smears, the student:

- | | | | | |
|--|-----|-----|-----|-----|
| a. Washed hands..... | [] | [] | [] | [] |
| b. Mixed the blood specimen properly.... | [] | [] | [] | [] |
| c. Placed a small drop of blood on the slide approximately 2 cm. from the edge and on the midline..... | [] | [] | [] | [] |
| d. Spread the drop using a spreader slide..... | [] | [] | [] | [] |
| e. Allowed the slide to air dry. | [] | [] | [] | [] |
| f. Labeled the slide properly..... | [] | [] | [] | [] |

Each prepared slide:

- | | | | | |
|--|-----|-----|-----|-----|
| a. Showed a smooth gradual transition from thick to thin..... | [] | [] | [] | [] |
| b. Showed a feathered edge at the thin edge and covered no more than three-fourths of the slide..... | [] | [] | [] | [] |
| c. Did not have any streaks of blood extending beyond the thin edge..... | [] | [] | [] | [] |
| d. Showed an even distribution of cells when stained..... | [] | [] | [] | [] |
| e. Was suitable for a differential count..... | [] | [] | [] | [] |

INSTRUCTOR'S FINAL CHECKLIST, (page 2)

The student should be evaluated according to the performance ratings in the box. Indicate on a separate sheet of paper whether the student's performance for each item is Fully Accomplished, Partially Accomplished, Not Accomplished, or under certain circumstances, Not Applicable.

Performance Level: All items must receive a rating of FULLY ACCOMPLISHED (or Not Applicable). If any items are rated Not Accomplished or Partially Accomplished, the student and instructor will decide which learning activities must be repeated.

Fully Accomplished	Partially Accomplished	Not Accomplished	Not Applicable
-----------------------	---------------------------	---------------------	-------------------

(2) In staining the slides, the student:

- | | | | | |
|---|-----|-----|-----|-----|
| a. Placed each slide on the staining rack properly..... | [] | [] | [] | [] |
| b. Covered each smear completely with Wright's stain..... | [] | [] | [] | [] |
| c. Did not allow the stain to dry out... | [] | [] | [] | [] |
| d. Applied the buffer properly..... | [] | [] | [] | [] |
| e. Blew on each slide properly..... | [] | [] | [] | [] |
| f. Washed the slides properly..... | [] | [] | [] | [] |
| g. Air dried the slides..... | [] | [] | [] | [] |
| h. Timed each step of the procedure properly..... | [] | [] | [] | [] |

The stained slides:

- | | | | | |
|--|-----|-----|-----|-----|
| a. Did not show any precipitated stain..... | [] | [] | [] | [] |
| b. Had red blood cells stained orange-red..... | [] | [] | [] | [] |
| c. Had platelets stained violet to purple..... | [] | [] | [] | [] |
| d. Had lymphocytes and neutrophils with dark purple nuclei with monocytic nuclei a lighter purple..... | [] | [] | [] | [] |
| e. Had eosinophils with bright orange granules and basophils with dark blue granules..... | [] | [] | [] | [] |
| f. Had cytoplasm of all leukocytes stained the standard color and shades..... | [] | [] | [] | [] |

CHECK-OUT ACTIVITIES

The statements below explain the activities you must be able to complete in order to finish this module. As you go through each activity, your instructor will rate your performance using the Instructor's Final Checklist, MAKING AND STAINING BLOOD SMEARS.

- (1) Your instructor will give you three labeled whole blood specimens. Make smears of each specimen that will be suitable for staining with Wright's stain.
- (2) Your instructor will give you three prepared slides. Stain each slide with Wright's stain.